MOTOROLA NEWS GRAM

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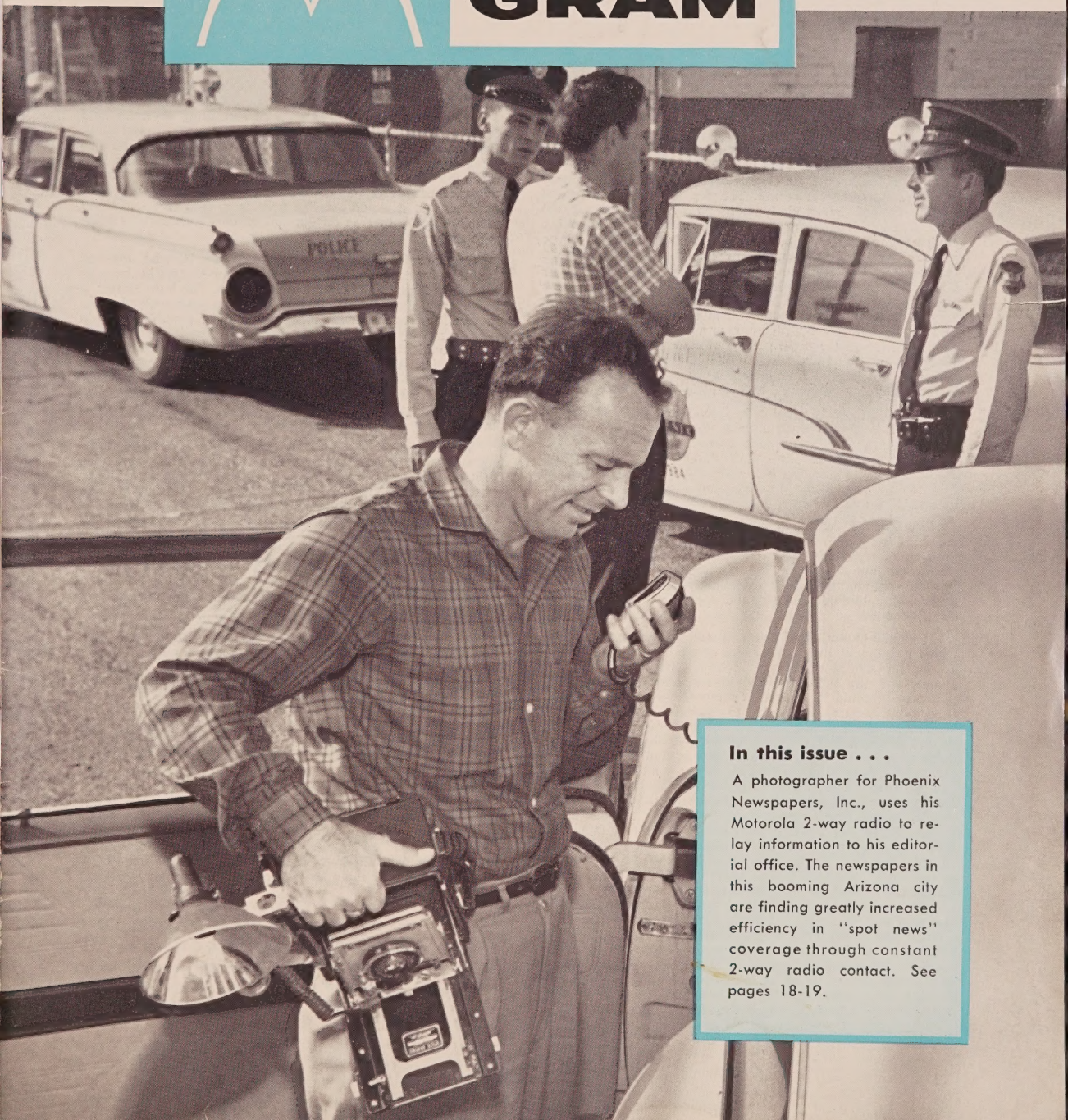


In this issue . . .

A photographer for Phoenix Newspapers, Inc., uses his Motorola 2-way radio to relay information to his editorial office. The newspapers in this booming Arizona city are finding greatly increased efficiency in "spot news" coverage through constant 2-way radio contact. See pages 18-19.

ONCE OVER LIGHTLY

For a long time, I have been "promoting" the use of an electronic golf cart. There has been an obvious trend toward the elimination of exercise in the game of golf. In the early days of the game, each player carried his own clubs.The first step at labor reduction was taken when a caddy was hired to carry the clubs and chase the balls. The next step was a move toward mechanization; the electric cart was introduced to carry the players around the course. The final step seems a logical continuation of the trend. I am proposing that we equip the electric cart with suitable range finders, actuators, and data link equipment to enable the player to sit at ease on the clubhouse porch, sipping dry martinis, while the cart bats the ball around the course and automatically radios the score back to the clubhouse for scoreboard display as the game progresses. A control button would be provided so that a player could introduce a random error whenever the accumulation of perfect scores became too boresome. With my electronic system, the players would not follow the usual pattern of coming in at the end of 18 holes, tired and disgusted. While it is probably true that they may not be intoxicated with joy at the end of 18 holes, it's a fair bet that they could be just plain—intoxicated.

Seriously, there is a point in describing this fantastic golf system. It is not impossible, with the present state of the electronic art, to develop such a mechanized system which would work somewhat as described. Obviously, the cost of developing and placing such a system in operation would be fabulously high, and such a development would represent the extreme limits of over-mechanization.

In reaching a decision about how far to go in the mechanization of the game of golf, we are not faced with any difficult problem of arriving at practical limits. If, on the other hand, we are concerned with the use of electronics and automation in some other more logical application, say for the handling of traffic and automobile control, the desirable limits are not so clearly defined.

It would be entirely feasible to set up electronic systems which would take over the control of the automobile as soon as the car moved on to the highway. The destination, the speeds, and the safety control in traffic could all be programmed or could be subject to computer control as required. It would also be quite possible to equip all cars with control equipment which would schedule the flow of traffic in cities, so that it would be impossible for a driver to jump the signal lights or behave in any erratic fashion in the handling of his car. I think there is no question about our ability to build complex working systems which would take the controls away from the driver, and which would eliminate traffic accidents to a substantial degree. For the most elaborate systems, the cost would be prohibitive, but the cost need not be a limiting factor for some degree of automatic control which would reduce traffic hazards. Speed on the highway could be controlled by the use of regulating radio transmitters along the highway which could actuate the control unit within the car. Hazards at intersections could be reduced by control signals which would not only provide stop and go signals, but would signal more effectively than a traffic policeman, by sensing the traffic flow and signalling in anticipation of the needs for both speed and safety. Every car could be equipped with a signalling device which would respond to a sensor system set up at blind corners to provide mutual warning for approaching vehicles. Automatic traffic speed control lights could be installed on the highway, or in school districts in town to stop all traffic whenever a car exceeded the speed limit. It would even be possible to equip every car with a radio control, so that radar speed measuring devices would turn off the ignition key of any car exceeding the speed limit. Police on motorcycles or in patrol cars could press the buttons which would turn off the ignition of a speeding car, and thus bring the car to a halt. Those of you who are familiar with the potential use of digital coding selective calling can also understand that it would even be feasible to stop cars selectively in this way, by turning off ignition systems without interfering with the performance of other cars.

Car-to-car personal communications has become less and less effective as the windows are closed for heaters in the wintertime and for coolers in the summertime. The horn system is not a very good answer to the car-to-car warning and communications requirements. It would be quite possible to equip each car with a short-range radio communications system which would provide voice communications within a few hundred yards radius. When you passed the fellow in front of you and cut in a bit too sharply, he could lift the microphone and say, "!!**XX!." Perhaps after all, this voice communications system wouldn't be a very good idea unless all motorists passed an aptitude test for courtesy.

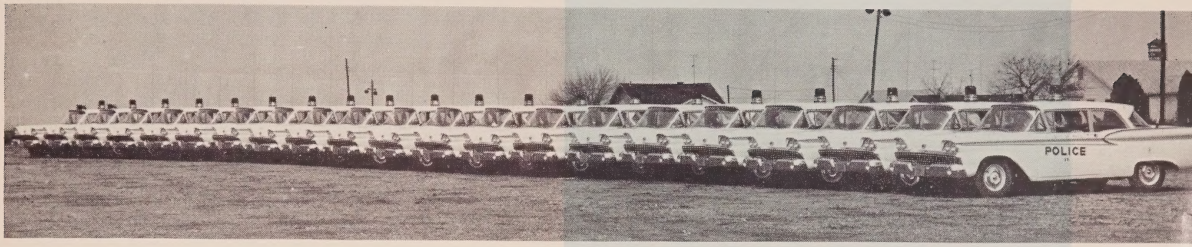
Seriously, there is a need for some sort of a personal warning system, and radio equipment could be used to actuate a light or sound a warning signal in the loudspeakers of other cars, or we could arrange to code the signal to indicate that the car in back was going to pass on the left or the right, with both visual and sound indicators warning the front car driver. Such equipment could also be tied into a general warning and information service. A car driving along the highway would receive either visual or audio, or both, indications for highway speed, approaching hazards, information about cut-offs and direction, and of course, information about approaching cars at blind corners and hills. The equipment could be coded so that the operator could press the button requesting directions for the proper turns to reach his destination. While traveling through a town, the driver could press a button for a general information service and receive a recorded transmission covering a brief history of the town, its population, its points of interest, and its chief claims to fame.

We can do many things with electronics to enhance the safety and interest of highway travel, and the limits are only determined by the limits of the imagination and the availability of money.

I have touched upon only two or three areas of potential control, not to advocate such control but merely to point out that, from a technical point of view, there is practically no ceiling to the scientific feasibility of gaining substantially complete control and safety. Somewhere in the range of feasibility, cost, and practicability, we should be able to find some electronic devices which can be put into immediate use to reduce traffic fatalities.

Dan Noble

The Waco fleet of police vehicles which have been equipped with Motorola "Quik-Call" selective signaling to provide better service from officers who can now patrol areas both in the car and on foot, thus extending coverage.



NEW POLICE EFFICIENCY IN WACO

When it looked like the police department in Waco, Texas was going to be forced to pull the patrolmen off their beats, the local citizenry flooded the department with complaints, and it became evident that some other expedient was called for.

The department, a user of 2-way radio for 20 years, found a ready solution by installing a Motorola "Quik-Call" selective calling system. Thus, police officials were not only able to keep the patrolmen on the beats but they also gave them a car to use.

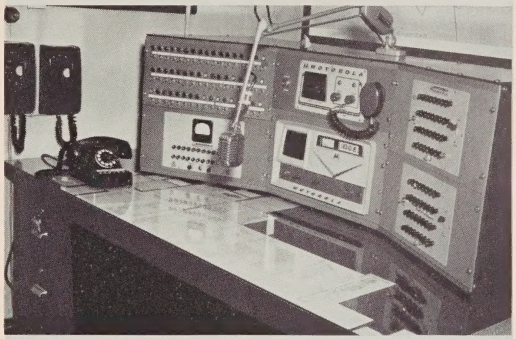
According to J. V. Gunterman, Chief of Police in Waco, the selective signaling system has added significant benefits for both the citizens and the department. For example, in certain areas and at certain times, the officer spends considerable time on foot. Since he can now be recalled to his car by "Quik-Call" selective signaling, he can perform many services that would not be possible if he were strictly "on foot" or confined to a car.

To signal an officer, the Waco department uses the "Quik-Call" system to blow the horn of the vehicle three times during day use and to cut in the rotating red beacon on top of the vehicle at night. A switch on the dash permits selection of day or night operation.

The department has found the selective calling system a great time saver too. Before it was installed, the patrol officer was forced to check out of service when leaving his car, even if only for awhile or to cover a short distance.

The "Quik-Call" signaling system is tied in with the department's two-way mobile radio system, which consists of a 60-watt primary base station with three remote consoles; a 60-watt auxiliary base located at the dispatcher's desk; 38 mobile units in cars; and two mobiles in three-wheel motorcycles. All mobiles are equipped with "Quik-Call" decoders. In addition, two "Handie-Talkie" portable radiophones are used for setting up communications away from vehicles. The system is put to good use by both the Waco Police Department and the McLennon County Sheriff's Department. » » »

Main dispatching console at the Waco police headquarters, showing the Motorola remote control console, related 2-way radio facilities and the "Quik-Call" selective signaling equipment which was recently added.



"Quik-Call" Selective Signaling

Basically, a system consists of a tone-generating console connected to the base station at the dispatching point and a decoder connected to the system's mobile units.

To signal a mobile radio unit in the system, the operator of the console pushes the appropriate button. The "Quik-Call" equipment generates a tone which is superimposed on the radio frequency carrier and transmitted to the decoder-equipped receiver. Mobile units can be notified of an incoming call by hearing it in the speaker, through sounding of the vehicle's horn, by flashing lights or other visual or audible devices. The dispatcher can call a single unit, a selected group of units or all of the units in a system by pushing the appropriate button.

LEADER IN A NEW AND BOOMING

It takes but a cursory study to reveal that Canada has probably a greater need for communications than any other country in the world. Within its borders are prospects for industry and business which bid fair to surpass the most optimistic outlooks of its growing list of entrepreneurs.

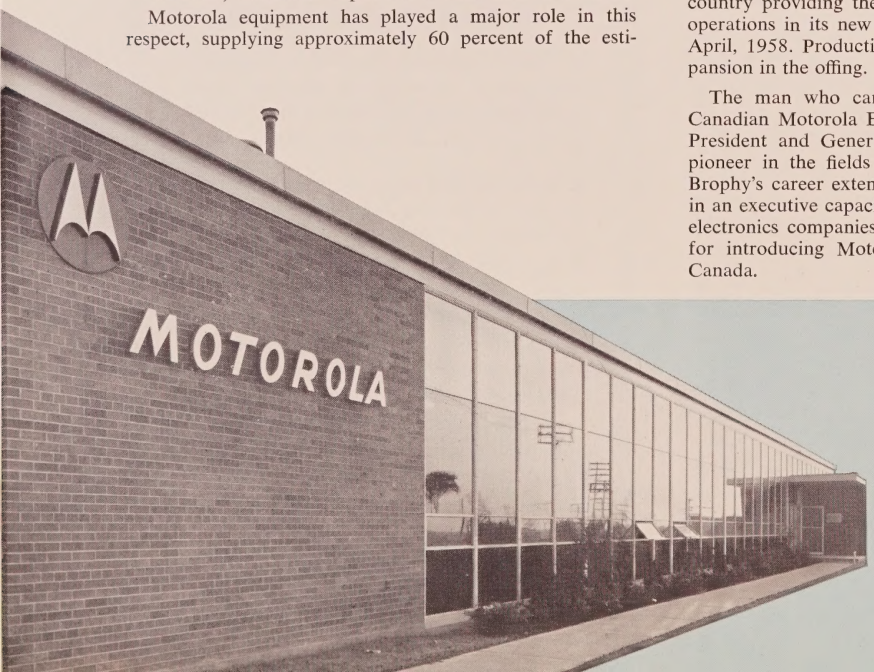
The problem of travel, which hampered growth for many years, has been largely solved through road and rail construction and widespread use of air transportation. Now, through the use of radio communications, many of the problems of maintaining contact over thousands of miles of trackless, sometimes impassable terrain have been solved.

Motorola equipment has played a major role in this respect, supplying approximately 60 percent of the estimated 35,000 mobile radios and the various microwave systems now in use throughout Canada.

Canadian Motorola has written its own success story by entrenching itself in Canada's rapidly expanding communications industry. One of the main reasons for this meteoric progress is that all of the key personnel previously connected with Motorola communications in Canada are now on the staff of Canadian Motorola.

With the most experienced team of communications engineers and manufacturing and sales specialists in the country providing the impetus, Canadian Motorola began operations in its new 25,500-square-foot Toronto plant in April, 1958. Production is already near capacity, with expansion in the offing.

The man who can be largely credited with bringing Canadian Motorola Electronics Company into being is its President and General Manager, R. M. Brophy. A true pioneer in the fields of communications and electronics, Brophy's career extends back to 1919 and includes service in an executive capacity with some of the largest radio and electronics companies in Canada. He was also responsible for introducing Motorola communications equipment to Canada.



Headquarters of Canadian Motorola Electronics Company in Toronto.

Key figures in Canadian Motorola's operations (left to right): Harold W. Seibel, National Service Manager; John E. Raftis, Manager—Microwave Division; Roy L. Taylor, Manager of Manufacturing; R. M. Brophy, President and General Manager; John F. Hooper, Manager—Mobile Division; Harvey Reid, Marketing Manager—Mobile Division; Eliot M. Auger, Vice President—Finance and Administration.

Brophy's accomplishments include service as Coordinator of Defense Production for the Canadian Government, beginning in 1950 at the outset of the Korean conflict and extending through the next four years. He then served three years as Deputy Minister of Defense Production.

"Canadian Motorola Electronics was formed to fill a definite need for a Canadian company specializing exclusively in electronics," Brophy points out. He adds: "We have barely scratched the surface in our country's communications field . . . our growth potential is tremendous.

"The opening up of our north is a case in point. Here, communications are vitally needed to unlock the existing

CANADIAN INDUSTRY

vast natural wealth. Radio and microwave communications offer perhaps the only economically feasible and reliable means of communication in these areas."

The famed Royal Canadian Mounted Police, for example, have greatly enhanced their reputation for "Always getting their man" by incorporating Motorola 2-way radio in their operations.

In British Columbia, where forest fires are very common, Motorola 2-way radio has aided in development of a novel way of "bombing" them out with tons of water. Modified flying boats equipped with huge water tanks skim over the nearest lake and scoop up tons of water, fly over the fire and drop their loads in great deluges. The aircraft are directed "on target" by Motorola-equipped fire-fighters on the ground.

In addition to Canada's mining, construction, lumber and manufacturing industries, the armed services and fire and police forces also have added greater efficiency to operations with Motorola Communications equipment. Add to this the other big Motorola mobile radio users such as railroads, utility companies, taxis—even the St. Lawrence Seaway Authority, for control of lock shipping.

And then there are the microwave networks serving telephone and telegraph companies, railways, government services and power utilities from coast to coast. An example is the 800-mile Pacific Great Eastern Railway's system extending from Vancouver to Fort St. John and Dawson Creek in northern British Columbia.

Technicians and men who built the 27 repeater stations had to work in some of the most rugged terrain imaginable . . . three mountain ranges—the Coast Range, the Selkirks and the Rockies. Many of the stations are more than 6000 feet above sea level. Sometimes equipment was prefabricated and flown to mountain top sites via helicopter—at other times, pack mules hauled the equipment to the destined location, men slogged along behind on snowshoes.

It was a tough, pioneering job at a cost of $3,400 a mile—but still far cheaper and more reliable in the long run than stringing land lines over the same route at approximately $4,200 a mile—with no guarantee that a storm or rock slide would not cause a breakdown at any time.

Canadian Motorola is now building a similar link for the Quebec North Shore and Labrador Railway, with 14 repeater stations covering 350 miles.

Brophy adds: "Business and industry in Canada are finding Motorola 2-way radio the ideal answer to greater efficiency . . . part of the solution to constantly rising costs of doing business."

"Canadian Motorola has proved it has the men and equipment to master these greatly varied communications problems," Brophy concludes. "We realize that as leaders in this field, we have a vital role to play, a challenge to provide these virtually unlimited prospects with the best in equipment, along with systems engineering and the service to keep systems operating at the optimum efficiency for which they were designed." » » »

To insure optimum reliability for its customers, Canadian Motorola's fully equipped laboratories combine advanced research with stringent environmental testing.

Part of the Canadian Motorola assembly line which is capable of producing annually the greatest number of basic mobile units of any Canadian company.

Many Motorola Service Station operators provide drive-to service from mobile vans as illustrated here.

Fred Guice, Chief Engineer for the Mississippi Valley Gas Company, indicates extent of his radio system.

CONTRACTED-SERVICING SCORES AGAIN

Operating under a Motorola maintenance agreement, 10 Motorola Service Stations keep the Mississippi Valley Gas Company's 300-mile 2-way radio network operating at peak efficiency.

Since 1952, the Mississippi Valley Gas Company has made extensive use of 2-way mobile radio in serving its 150,000 customers located throughout the state of Mississippi. About 120 mobile units and 24 base stations presently make up the utility's radio network. Long a believer in contracting out construction and maintenance work, Mississippi Valley Gas has for the past six years contracted maintenance of this entire radio network.

Fred J. Guice, the utility's chief engineer, explains that the widespread locations of the individual radio systems making up the company's network would make it impractical for the company to economically handle its own radio maintenance work.

For example, almost 300 miles separate the base station sites of Tupelo and Natchez. If one man were assigned to radio maintenance, he would have to spend most of his time driving. Using several crews for radio maintenance would be costly, says Guice, since each crew would need its own complement of test instruments, spare parts and space. There would also be the added manpower cost.

Consequently, in 1954, Mississippi Valley Gas entered a contract with Motorola Communications & Electronics,

Technician for Shank Communications checks out one of Mississippi Valley Gas Company's MOTRAC radios.

Inc., for complete preventive and emergency maintenance of its radio system. The same problems of distance that prevented the utility from easily servicing its radio equipment itself, also influenced its decision to utilize the services of a national manufacturer, rather than contracting directly with local firms.

To efficiently handle the job, several local companies would have to be used, posing the problems of multiple contracts, differences in rates and supervision of many firms. By negotiating a single contract, however, Mississippi Valley Gas has passed these problems on to Motorola. The Chicago company in turn administers subcontracts with the necessary number of local service companies, all part of its National Service Organization.

Basically, Motorola provides Mississsippi Valley Gas the following:

a. A monthly preventive check of each unit, with a report of its condition forwarded to MVG; (This satisfies the FCC requirements for semi-annual frequency checks.)

b. Emergency service whenever a unit fails;

c. At the request of MVG, installations and removals of mobile units.

Motorola utilizes 10 of its authorized system maintenance centers in Mississippi and one in Memphis, Tenn., to maintain the Mississippi Valley Gas system. While each station is assigned a certain number of base stations and mobile units, major elements of the MVG system are handled by Motorola stations in Jackson, Tupelo, Greenville, and Greenwood.

At Jackson, Shank Communications Company, operated by Robert Shank, maintains one MVG base station and 37 of its mobile units. The company is able to provide both drive-in and drive-to services. The communications shop is a large building including a garage, parts storage space, three test benches and an office. A full complement of test instruments is on hand. Owner Shank, holding a 1st class radiotelephone license, is a registered professional engineer. He has been a Motorola Service Center operator for seven years. He employs two licensed technicians.

Lee Radio Service, operated by J. W. Howard, is the station in Tupelo. This system maintenance center is assigned 7 MVG base stations and 21 mobile units. Lee Radio Shop facilities include garage, test benches, office and parts storage area. The company has two licensed technicians. Mr. Howard has been a Motorola Service Center operator for seven years.

Ottis Rushing, Jr., is the System Maintenance Center operator in Greenville. Responsible for 2 MVG base stations and 12 mobile units, the Rushing Communications Service specializes in drive-to service. Rushing and his technician both hold FCC licenses. Two fully equipped station wagons are used to carry parts and instruments to the location of the MVG radio equipment. The center also has shop facilities for special jobs.

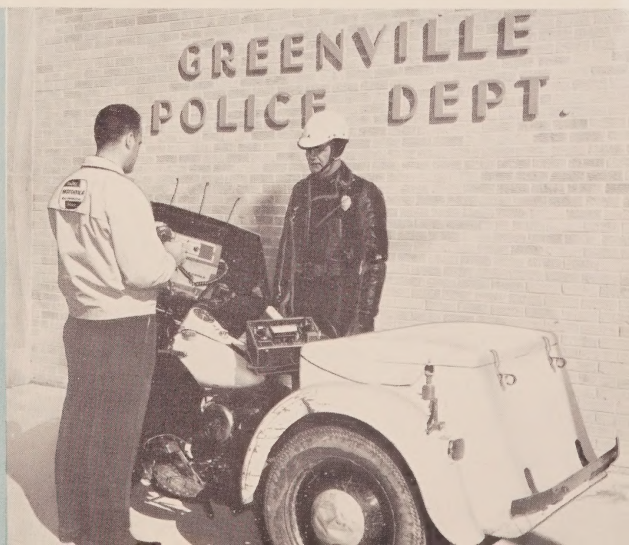
In Greenwood, Delta Communications Service is operated by Joe A. Essary. This center maintains 6 base stations and 14 mobile units.

Other System Maintenance Centers working on portions of the MVG system are located in Meridian, Louisville, McComb, Rolling Fork, Marks, and Columbus, Mississippi, as well as in Memphis, Tenn. Besides these stations, the Motorola organization in Mississippi includes maintenance centers in cities outside of MVG's area of coverage. While these stations ordinarily do not work on the MVG system, they are available for backup support should it ever be needed.

Direct administration of the work is provided by the Motorola Field Service Representative, stationed permanently in Jackson. At the Dallas headquarters for Motorola

At Shank Communications in Jackson, technicians work from this well-equipped shop which has facilities for handling virtually any servicing job.

Motorola Service Station operators are equipped and capable of maintaining all types of 2-way equipment including this special motorcycle unit.



Personnel from Rushing Communications adjust antenna in Greenville.

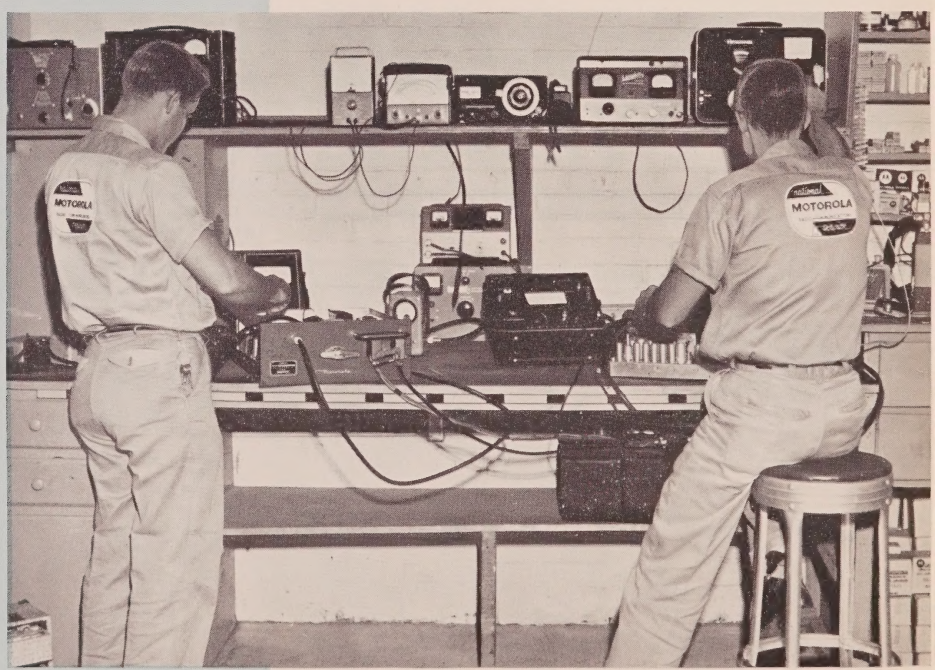
in the South, there are accounting facilities, a parts depot, a system engineering department, and sales administration offices. The entire facilities can be utilized when needed to carry out the MVG contract.

As part of contract administration, the Motorola service engineers periodically inspect the work of the service stations and also check the shop facilities to make certain the necessary instruments and spare parts are on hand.

While each maintenance center carries its own basic supply of tubes and parts, the Dallas depot maintains a large inventory of all needed parts and components. The facility provides 24 hour a day, seven day a week service so that necessary parts are only hours away from the Mississippi Service Stations.

A big advantage of dealing with one single national source for service of a large system is the billing practices that are possible. Motorola extends credit card privileges to the Mississippi Valley Gas Company. The utility receives a single monthly bill, rather than invoices from a large number of local electronic service companies.

The Motorola Service Center operators and technicians are taught new techniques and practices each year through a traveling clinic sponsored by the company. This, plus a continuous flow of technical literature from the Chicago plant to all service stations, assures maintenance contract users that the station technicians are abreast of all new developments. » » »



Extensively equipped with modern test instruments and related tools, this work bench at the Pascagoula center makes quick work of maintenance activities which must be performed in the shop.

A Brackett driver receives "on-the-run" instructions concerning a pickup of a rush shipment of perishables.

Base station equipment at Brackett Bros. headquarters includes the "Compa-Station" base station connected to a desk top microphone.

EXPEDITING FREIGHT SHIPMENTS

"Don't Miss the Flight, Call Us Day or Night"—this is the sign on the side of Brackett Brothers Transfer Company trucks working in metropolitan Atlanta. To make certain there'll be no missed flights, Charles Brackett has emphasized his slogan by putting his entire operation under radio control.

Since he specializes in handling air freight, Brackett must be able to meet all requests for rush service. To do this he operates eight pickup and delivery trucks. Without radio, however, he feels he would need twice that number and twice the number of drivers to adequately serve his customers. Also, by converting to Motorola "Private-Line" radio and a new frequency early in 1959 he has been able to reduce by one the number of trucks needed, although business volume has continually increased.

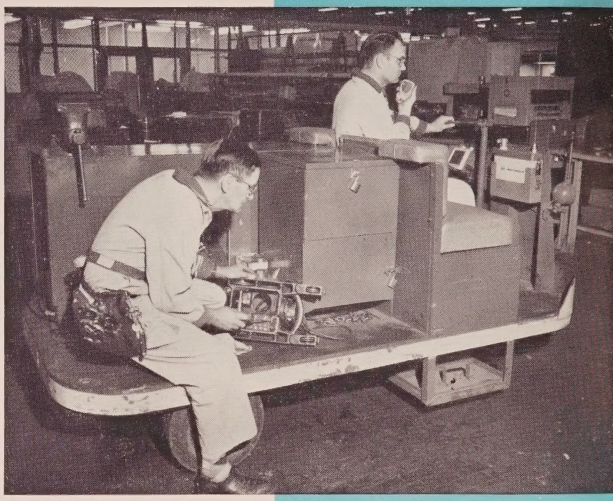
How 2-way radio is used in the Brackett business is quite apparent. As calls come in for pickups, Brackett can relay them via radio to the driver nearest the pickup spot. This saves backtracking and wasted miles, enabling each of his men to make more stops per day. Brackett says he can handle all pickup orders within 45 minutes. That's quite a job considering the 137-square mile greater Atlanta area.

Deliveries are not radio controlled to the same extent as pickups. However, most persons expecting air freight are inclined to be rather anxious about their shipments. They'll often call Brackett to find out when it will be delivered. All he needs do is make a quick radio call to the driver with the item to find out how soon he will be at the delivery spot. If there is a rush, he can direct the driver accordingly. In any event, the consignee receives precise information on how soon he can expect his shipment.

Brackett has had his present two-way radio system since early 1959, when he installed the Motorola "Private Line" radio on a new Business Service channel. He formerly had been using a crowded frequency in the 450 mc Citizens Band. The "Private Line" equipment is designed to block out the reception of interfering co-channel messages, and so alleviate this form of annoyance.

The new system utilizes a 100 watt base station and an 80-foot antenna tower at Brackett's office in suburban Hapeville, near the Atlanta airport. This arrangement provides consistent mobile-base communications of 30 miles, enough to cover the Atlanta area. Seven of Brackett's eight trucks are radio equipped. The one that isn't remains at the airport at all times to transfer freight from one plane to another. » » »

RADIO AIDS USE OF MOBILE SERVICE BENCHES FOR INTERNATIONAL HARVESTER COMPANY



The radio-dispatched service truck at International Harvester is fully equipped with tools and materials required for on-the-spot repairs.

If power or any electrical machinery fails at International Harvester's Melrose Park, Illinois, plant, aid is only seconds away.

To provide this speedy response to emergencies, the company utilizes 2-way radio-equipped, and battery-powered shop trucks.

Designed and constructed by the Melrose Park plant, these trucks are actually mobile service benches, containing tool bins, parts, vises, and all other material needed for most jobs. Two experienced electricians ride each truck. The Motorola Industrial "Dispatcher" was built right into the trucks at the start.

The plant, which manufactures heavy construction machinery, utilizes six radio-equipped vehicles to handle all electrical repair needs. One of these is used for emergencies, such as power failures or conveyor or machine breakdowns. Ordinarily, this vehicle is assigned only jobs that can be delayed if emergencies appear. Dispatching of all vehicles is handled from one control point. As requests for service come in, the dispatcher radios the order to a vehicle near the request.

The radio-equipped trucks were put into operation in September of 1959. Before then, four stationary service benches were situated throughout the plant. Since the trucks came into use, the stationary benches have been eliminated, gaining valuable space for production and freeing electricians for construction work. The mobile benches not only reduce the number of men needed, but give better service because they can be moved right to the scene of a repair assignment.

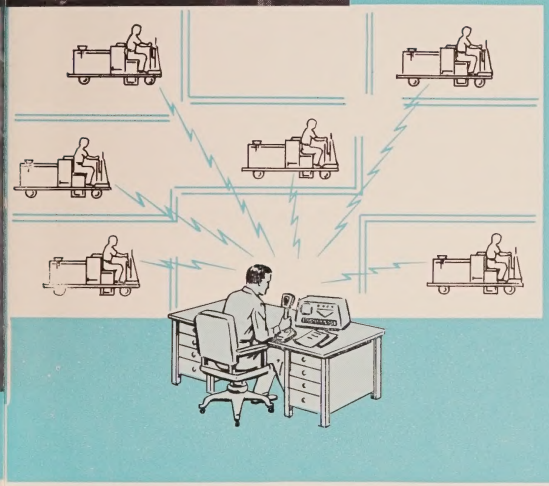
With the mobile shop vehicles, the advice of a foreman is available instantly regardless of job location. Radio dispatching makes possible four specific advantages:

1. It speeds truck arrival at job sites.
2. It reduces truck mileage.
3. It provides greater control for electrical servicing department and its personnel.
4. It increases efficiency.

Getting to particular repair jobs in a hurry is imperative. Breakdowns of conveyor belts or machines slow production and put large numbers of people out of work temporarily. The battery-powered vehicles can be dispatched to a job in a matter of seconds. When the electricians get there, they have all the material needed for making a fast repair. Only a minimum of production time is lost.

One repair job completed, the truck crew is on its way to another location.

This Motorola Utility Base Station is the focal point of the International Harvester system. As requests for service are received in the office, the message can be relayed immediately to an available truck.



Motorola Industrial "Dispatcher" radio units, utilized by the Harvester plant, are 8-watt compact units that blend well in this application because they can be easily mounted on the dash of the trucks and require only a minimum of space. Transistorized as well, these units are ruggedly built to take any jarring that results in the normal operation of the shop trucks.

The radio system includes a 25-watt utility base station and antenna, which is mounted on the roof of the plant approximately 45 feet into the air. The system operates on the 153.35 mc band.

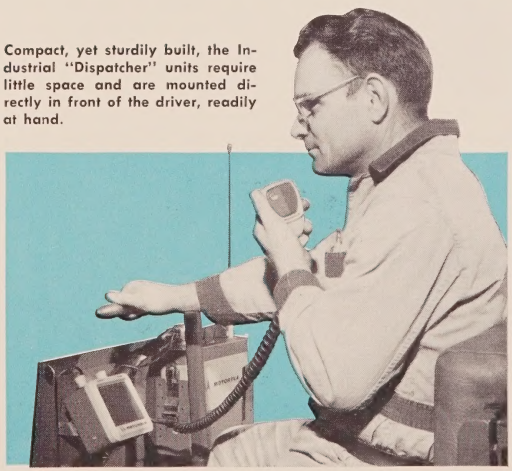
All maintenance of the radio system is performed by an authorized service station under subcontract from Motorola. A local servicing company provides regular preventive and thorough emergency maintenance on all equipment in the system.

The combination of the custom-built shop trucks and a 2-way radio system has given International Harvester's Melrose Park plant a line of mobile service benches to effectively handle all repair situations. » » »

The second benefit — a reduction of mileage — occurs through proper dispatching of vehicles. One vehicle can handle two or three requests for service in the same general area. The dispatcher radios each order to the electrician as it is received. Without the radio system, the vehicles would be returned to the pool after each "call," and possibly have to go back to the same area for the second and third jobs, resulting in many wasted miles.

Greater control of the service department is achieved through the radio system because the dispatcher knows the whereabouts of all his electricians at all times. The locations of all crews are kept on a large map at the shop. Magnets represent each crew.

With radio, efficiency is greatly increased, because the trucks can get to the scene of any breakdown in a matter of minutes and usually have the needed parts and tools with them.



Compact, yet sturdily built, the Industrial "Dispatcher" units require little space and are mounted directly in front of the driver, readily at hand.

Production office secretary uses 2-way radio to contact plantation manager concerning location of certain equipment.

RADIO COORDINATES DIVERSIFIED

Thirty-eight thousand acres, 200 tractors, 1,000 workers —these are just a few vital statistics concerning the size of the Delta and Pine Land Company, Scott, Mississippi. Add to this size widely diversified activities ranging from the primary cotton and cotton seed cropping to running 5,000 head of beef cattle and planting 7,000 acres of grain and you have a need for management communications that can be fulfilled only by two-way radio.

Delta and Pine Land is the South's largest cotton plantation, made up of what was formerly 17 individual estates in the Lake Bolivar region of the Yazoo-Mississippi delta. The total area of 38,400 acres surrounds the company owned town of Scott, located about 14 miles north of Greenville.

The D & P L complex consists of many types of soils and the company has diversified to the extent needed to make best uses of these soil types. In 1959, 9,300 acres were planted to cotton. Another 130 made up the cotton research farm, from which about one-third of all cotton planted in this country originated.

Grain crops including rice, soybeans, corn, oats, barley make up 3,000 acres each. Another 7,500 acres was devoted to pasture.

Minor Gray, D & P L president, points out location of the town of Scott on map of 35,000 acre plantation.

The rest of the acreage is woodland, some of which is producing. Much of the white sandy soil covering part of the plantation is used to run 5,000 Hereford beef cattle. In conjunction with this activity, D & P L operates a packing and a rendering plant in Scott.

From this information, it can be readily seen that here is what could be a monumental problem of administrative control. The company, however, has greatly simplified its supervisory problems through the use of Motorola 2-way radio.

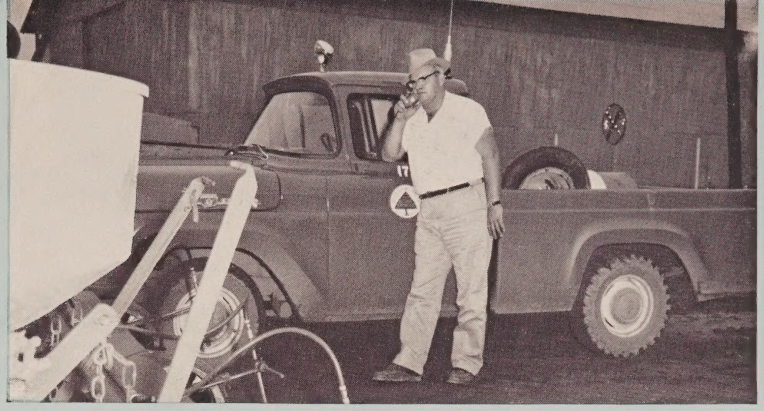
This radio system consists of a central base station at Scott, also the site of the 165-foot antenna tower, and 22 radio-equipped vehicles. The base station can be operated from remote control consoles located in the production department office, from the machine shop and from the central PBX switchboard. Vehicles equipped with 2-way radio are used by various headquarters and plantation managers.

Utilization of radio contact takes various forms, from mobile to mobile contact to direct or relayed calls from the telephone switchboard. Some of these uses as outlined by B. M. Nunnery, production manager, include:

Since the plantation managers and key management personnel spend much of their day in the vehicles, 2-way radio is the only means of providing communication. Keeping informed is a big task of all managers, and the radio is constantly used to interchange information between the various field men and the offices.

To take full advantage of weather and crop conditions at various plantations, managers exchange men and equipment via radio. Often because of D & P L's large area, there will be different weather conditions in various parts of the estate.

Keeping equipment in constant operation during the seasons it is in use, is quite important. Normal equipment maintenance is performed during the night so that no daytime production is lost, but during emergencies, 2-way radio is used to contact the central maintenance shop and a mechanic is sent on the double. Should the mechanic



Plantation manager uses radio to question machine shop about availability of equipment and spare parts.

FARMING OVER 58,000 ACRES

find that he needs additional tools or parts when he arrives at the scene, the radio is again used to contact the central shop to have them sent out.

The supply truck is another vehicle that makes constant use of its 2-way radio. This vehicle is used for errands between Scott, Greenville, and Cleveland—distances of 14-30 miles. Picking up material and supplies in the latter two cities keeps this man on the move all day, and radio saves countless miles of backtracking in this respect.

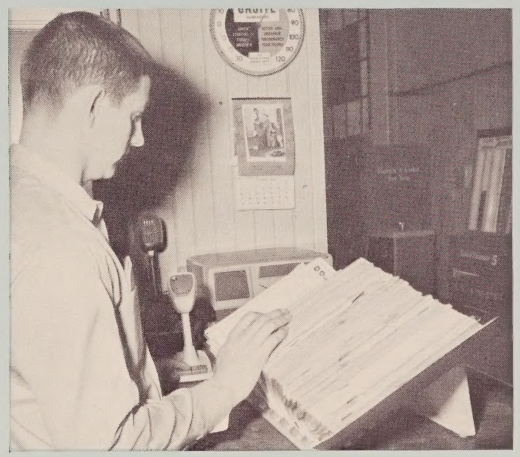
"Without communications," says Nunnery, "the men in various vehicles would have to spend much more time driving from one place to another for information." He says that radio has cut vehicular mileage 25%. Not only is the vehicle operating cost lessened, but the time spent in driving can be used for other more important tasks.

During the crop dusting season, 2-way radio is used to coordinate the entire operation. Pilots can be directed to the correct fields by the various plantation managers. During the cotton-picking time, careful scheduling of the company's four gins is necessary. Radio communications from vehicles at the gins to men in the field is used extensively at this time.

The two-way radio system itself is leased by Minor Gray, President of D & P L, for use of his own Gray Farms and is operated on a non-profit basis with D & P L. Included in the contract with Motorola, is a complete maintenance agreement which provides for regular preventive maintenance and necessary emergency servicing. The contract is performed by Motorola's authorized service station in Greenville.

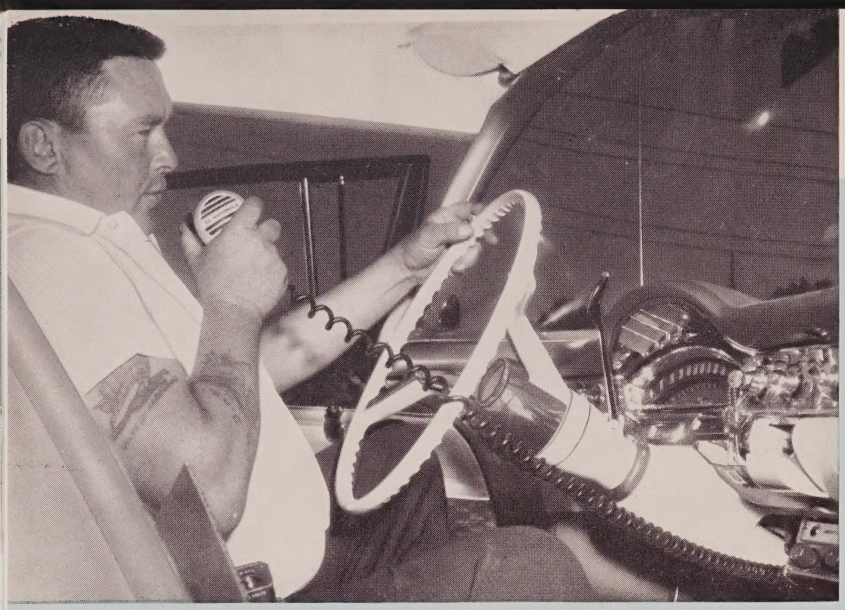
The Motorola "Private-Line" radio equipment is designed to block out interference from other radio systems using the same channel. The system is licensed on a Special Industrial frequency 47.64 mc.

As for range of the system, Nunnery reports a consistent 40 miles can be reached when speaking between the base station and a mobile unit. 10-15 miles is possible during direct mobile-to-mobile communications. » » »

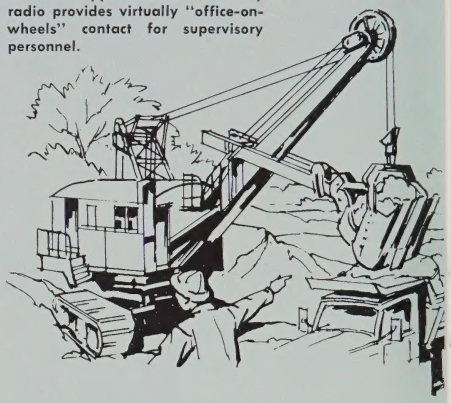


Machine shop clerk checks supplies before answering plantation manager over radio system.

Technician at authorized Motorola Service Station in Greenville performs routine maintenance on Motorola Remote Control Console.



Typical mobile installation in one of the Tripp vehicles. Two-way radio provides virtually "office-on-wheels" contact for supervisory personnel.



2-WAY RADIO SPEEDS SEWAGE PROJECT IN 15½ SQUARE

Dispatching of the fuel wagon used by Barnes on the $400 thousand dollar-plus contract is accomplished via 2-way radio, thus keeping heavy equipment working.

Touch-and-go operation of shovel and high-lift along busy highway route 20, Erie, Pa., is frequently checked by Tripp superintendent Barnes. He can call in additional help quickly if needed.

Township inspector for Millcreek, left, checks detail of right-of-way over the Tripp Motorola 2-way radio hookup, using a Tripp pickup truck unit to talk to Barnes, who is at another location.

MILE TOWNSHIP

In construction work involving contracts won only after close, competitive bidding, the most efficient use of men and materials is a vital factor in completing the job on time and in earning the most profit from the undertaking. And when crews and required machinery are scattered over a wide area the problem of close contact becomes intensified, especially if the sites involved are in locations where the telephones may not be readily available.

To solve this problem, many contractors have found a ready answer in the fingertip control afforded by 2-way radio. A case in point is George Tripp, Inc., a utility contractor of Pontiac, Michigan. This firm utilized 2-way radio to the fullest during the installation of some 45 linear miles of sanitary sewers in giant Millcreek Township, near Erie, Pennsylvania. The firm was one of a group of contractors from several states who shared in more than $4 million in contracts. Of this total, Tripp's share was around $400 thousand dollars.

To coordinate the work of his crews and an operation of 2 big backhoes, several high lifts, a fuel truck, back-up trucks and heavy dump trucks on the fast moving project, Tripp utilized the Motorola 2-way radio system.

Tripp's superintendent, Jim Barnes, had from 35 to 40 employes to oversee. The work required shifting of heavy shovels and trucks at a minute's notice to keep trenching and pipe-laying progressing at its most efficient pace. Any delays in the use of this expensive equipment would have meant dollars dribbling away on the contract profits.

"Motorola 2-way radio has greatly aided us in expanding utility contracting throughout the central United States," Barnes affirms. "We streamlined our operations, and we get around much faster with 2-way radio communications. Now that we are used to it I know what a tremendous asset it can be. We'd be lost without it."

Movement of equipment is so efficient, Barnes reports, that as much as four or five hours can be saved in such matters as dispatching a unit like the backhoe, and directing the job it must do at a new location. Gasoline and maintenance savings are evident, he says, and supervisory personnel need not "run their heads off" from one part of the job to another, keeping things rolling or checking on the work.

"Of course the workers know we can keep closer tab on them, and that means we get better results," Barnes admits. "Whereas they might have resented that a little, they appreciated having the radio handy when they wanted to check the base station about telephone calls, and so forth. So it was a 50-50 proposition, and morale was improved."

Millcreek Township itself has had for several years an exemplary Motorola 2-way radio communications system for its fire department and police force. Township supervisors, like William Heidt, and engineers, like Kenneth Page, were vitally concerned with the giant sewering project, and were also linked, through a township truck radio unit, to the township offices—fire and police departments.

"Several times these township officials had found it expedient to communicate via 2-way radio to this office," reported one engineer on the project. "There was no doubt that 2-way radio helped official execution of this big sewering job, along with the use the many contractors made of the efficient communicating systems they owned."

It was interesting to note, as pointed out by Barnes, that the use of 2-way radio throughout the vast sewering project did not necessitate any special training of workers on trucks, fuel wagons, or other equipment utilizing this communication method.

"Anyone in our company who must use 2-way radio to do his job more capably needs just the briefest of instructions from our supervisory personnel," according to Barnes. "We've found the system is not complicated, and anyone who qualifies for a job with us can also use a 2-way radio." » » »

STORE PROTECTION VIA

Abraham & Strauss Protection Department secretary launches radio paging signal by signalling a floor detective after receiving a telephone call from a clerk concerning a suspicious person in the store.

"Getting away with the goods" at the Abraham & Straus Department store in Brooklyn, New York, has become a near impossibility for would-be shoplifters.

Two years ago, the store's Protection Department, realizing the importance of a fool-proof paging system, installed a brand new form of communications — Motorola "Handie-Talkie" radio paging.

Gone are the flashing lights and chime paging devices that in years past, left much to be desired. Instead, Protection Department operators and uniformed guards wear the compact "Handie-Talkie" pocket pagers that receive messages broadcast by a central transmitter located in the Protection office. Only the person paged hears the message, since the system is entirely selective.

The system works simply. A low frequency tone is generated and transmitted to the receiver worn by a guard. When the signal is sent, an alerting tone sounds in his receiver, indicating that a voice message will follow. Only the receiver worn by the guard gets the alert and the message —all other pagers in the system remain silent.

To illustrate a use of radio paging by Abraham & Straus: A sales clerk, spotting a suspicious person in her department, calls the Protection office. "Miss Jones" is chosen to investigate. The appropriate selective button on the control box is pressed, and the secretary gives the message. "Miss Jones" receives the message and proceeds to the department involved.

Abraham & Straus officials report three major advantages of Motorola radio paging. First, since the network covers every inch of the 10-floor, one million square-foot building, it is certain all messages are received. There are no blind spots with the Motorola radio pager.

Second, complete voice messages and alerting signals can be sent over the radio system. There is no need for the operator to telephone the office for instructions, except in a few special cases.

Third and most important, the Motorola radio paging system is secret. It is selective within the department and completely private from professional shop-lifters. The professionals are skilled at deciphering chime and light signals but cannot hear the radio messages.

The paging system is used 24 hours a day. On specified nights, teams of German Shepherd dogs flush out the entire store. The guard handling the dogs wears a radio pager. If a night maintenance person sees or hears anything unusual he telephones the night superintendent who is stationed at the radio control box. The superintendent relays the message to the detective with the dogs who then investigates. For full effectiveness, no one outside the department knows when, where, or how long the dogs are working.

Twenty-one paging receivers are used at Abraham & Straus. These equip all Protection Department persons working at a single time. It is easy to conceal the compact 10 ounce receivers. The men clip them to their belts or wear them in a shirt or coat pocket. The women detectives usually carry the receivers in their purses.

The liability claims representative also wears a radio pager so any accident can be immediately reported to him. This enables him to arrive on the scene in time to acquire all the necessary information and get witnesses to protect the store from fraudulent liability claims.

"The paging system installed by Motorola," according to Virgil W. Hervey, Protection Manager of the store, "has proven to be a most valuable asset to the Protection Department. It enables doing much more with the same number of personnel. Its effectiveness is incalculable." » » »

RADIO PAGING

Protection Manager Virgil W. Hervey, wearing "Handie-Talkie" Pocket Pager on belt, confers with one of the guards in his department.

Women detectives carry the paging receivers in their purses. The men clip the small 10 ounce units on their belts or wear them in shirt or coat pockets.

Guard on night duty with team of German Shepherd dogs receives radio message that unusual noises have occurred in an area of the store. Since the message is selective, only the guard hears it.

TWO-WAY RADIO

Dispatcher Ralph Camping hands technician Tommy Bullock identification for slides and gets ready to radio a police reporter to cover a new assignment.

The two-way radio is becoming as important as a camera for Phoenix newspaper photographers.

An ambulance from one direction, a police car from another—sirens scream and tires squeal as they brake to a stop in downtown Phoenix. "Where have you guys been," the photographer joshes while he lines up and pops another flash bulb. Good natured kidding, but it happens frequently. Sometimes Motorola two-way radio in photographers' cars gives newsmen the edge in races to the scenes of disaster.

"It's been a Godsend," says Ivan Mashek, chief photographer for Phoenix Newspapers, Inc., which publishes The Arizona Republic and The Phoenix Gazette. Three receivers in the newspaper office monitor city police, sheriff, and highway patrol radio systems. Speakers are located on the city desks of each paper, and a third set is in the photography offices. The base station for the 10 mobiles is also in Mashek's office, and the dispatcher has constant control of all staffers on duty.

"When the dispatcher hears a police call on the monitors, he relays it to the nearest mobile. If the mobile is closer than the nearest police unit, we get there first. It's as simple as that. What's more, we get some terrific pictures that way," he grins.

Before the system was installed, Mashek says, photographers would check in to the office in person or by phone every hour or so. "But it always seemed there was nobody on call when the big stories came along," Mashek said.

Mashek and Ralph Camping share dispatcher duties and ride herd on staffers who must cover a valley 36 miles long by 15 miles wide. Sometimes the photographers are assigned much farther out on a feature story. Once they'd left the office, in the days before radio cured Mashek's ulcers, there was no way of contacting them or calling them back if the assignments were cancelled or a big story broke. Frequently, fast breaking stories had to go in the paper without art.

Communications is always a problem in a state as large as Arizona. One-third of the state's population lives in metropolitan Phoenix. The only other large city is Tucson. The mobile setup was designed to give dependable coverage of a 25 mile radius of the downtown offices of the newspapers, which would nearly blanket the state's largest concentration of population. "But we are getting good re-

SPEEDS THE NEWS

sults 30 and 40 miles out," Mashek says. "Every direction from here is up, and except where mountains interfere, we get good line of sight communication."

Once from 50 miles away, minutes from a deadline, photographer Nyle Leatham radioed in a story about the finding of a lost boy in a mountain canyon northeast of Phoenix.

The weary boy's name was Davy Smith, but when questioned, he insisted he was "Davy Crockett, king of the mountain men." The quote and story made the AP trunk wires. Leatham got a page one by-line and a bonus, and Mashek chalked up another first for his mobile radio units. Leatham was back and had a picture of the boy and his tearful mother in later editions of the paper.

Although a photographer and not a reporter, it was Leatham who "busted" the paper wide open between editions one night when Leatham's home town of Mesa, in the east end of the valley, was struck by a sudden storm that ripped out phone and power lines, flattened trees, and tore roofs from houses. Leatham reported in by radio he was going out to get pictures, and kept a running account coming in of the damage as he spent two hours battling the storm to take shots of the damage. A rewrite man put together the story, changing from edition to edition as the night wore on. Leatham finally made it back to the office to print two pages of art for the city edition.

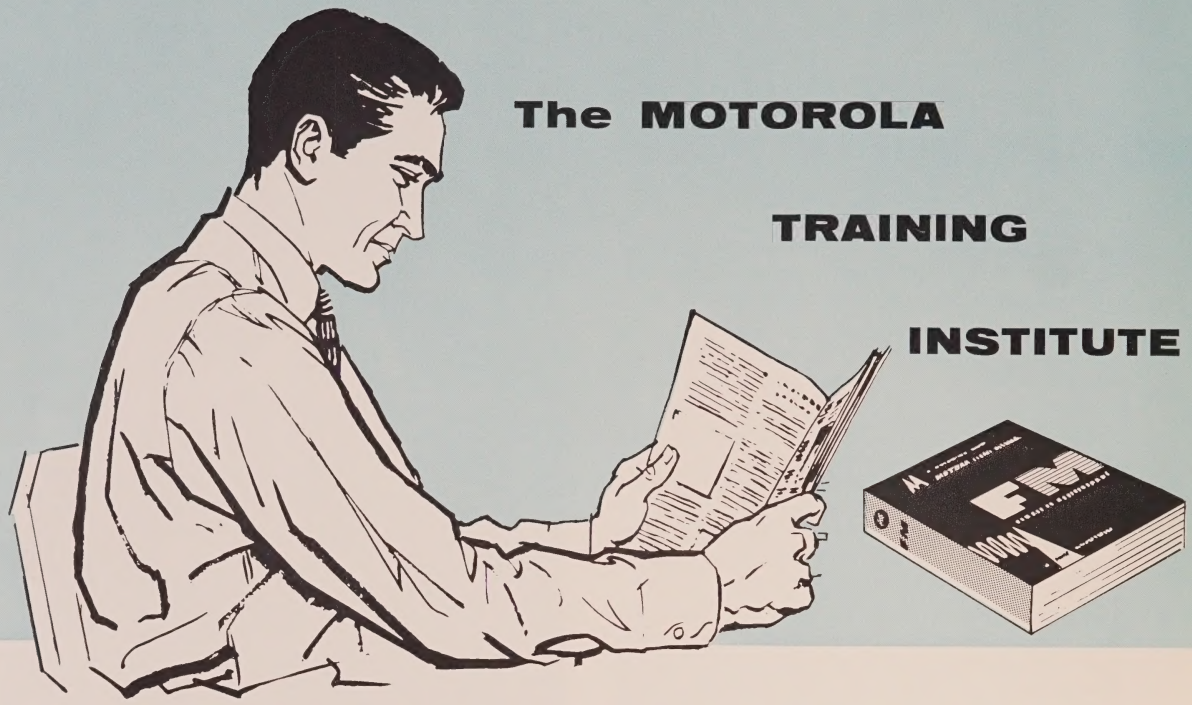
"One thing I forgot to tell you," he told a startled rewrite man, "the roof of my own house blew off." Leatham had not only forgotten his own loss, but he had forgotten to take a picture of it.

Two of the papers police reporters have radios in their cars, and Johnny Johns, reporter for the Phoenix Gazette, keeps the airwaves hot as he races all morning against the early deadlines of an afternoon paper. Johnny carries a camera too, and it's not unusual for him to cover an accident, radio in a story to Camping as he's headed for a shooting, and stop just long enough to hand the slides to another radio car on its way to the office.

The Phoenix papers know there are no bargains in second-hand news stories. Motorola radio helps the Gazette and Republic provide first-hand news coverage faster than ever before. » » »

Nyle Leatham, in rugged Arizona country, 30 miles from home office, keeps radio contact.

Right, Johnny Johns, Gazette police reporter, radios in an accident story while police question a witness.



Another "First" in the Radio

THE MOTOROLA TRAINING INSTITUTE, which began accepting enrollments early this spring, has already received tremendous acceptance in the 2-way radio industry. To date, students from all over the nation are taking this specialized training. Enrollees include *both* technicians with a limited amount of electronic knowledge and those servicemen who already have an extensive background in communications equipment servicing.

This acceptance bears out Motorola's decision to present this course at a time when the 2-way radio industry was booming and showing no signs of a letup. Preparations for the course began several years ago when the shortage of qualified service technicians was already apparent.

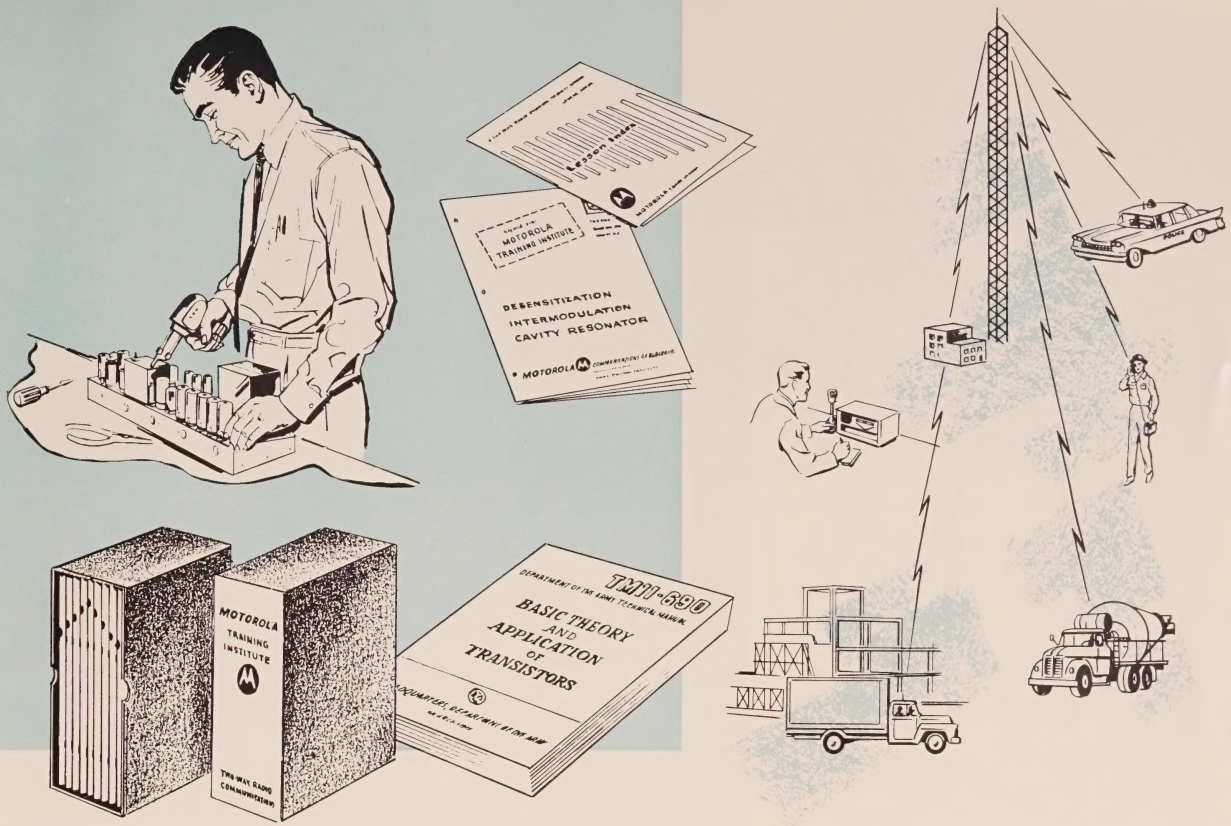
This was one reason for establishing the MOTOROLA TRAINING INSTITUTE — the only home study course available which is devoted exclusively to the study of 2-way radio servicing. Another important reason for offering this training was the fact that radio components and equipment were increasing in technological complexity, thus bringing on a need for advanced training in certain areas of 2-way radio servicing.

The new MOTOROLA TRAINING INSTITUTE course is designed to cover all phases of 2-way radio communications . . . theory of circuit operation . . . system analysis and circuitry . . . new, specialized test equipment . . . new transistorized equipment— receivers, power supplies, transmitters.

Furnished with this course are 38 separate, fully-illustrated lessons, 9 supplementary texts, more than 20 reference articles and technical bulletins. To add greater versatility to the course, materials are designed to permit revision and thus keep the student continually supplied with the most up-to-date references and information on technological advances.

Each lesson covers a specific topic, and each is covered in a separate written examination. Lessons are furnished in convenient, pocket-size booklets. After the student has studied a lesson, he completes the examination and returns it for grading. The student may immediately begin the next lesson, not waiting for grading and comment on the lesson just completed.

To speed each student's progress, the fully qualified instructors familiarize themselves with each student's



Communications Industry

background as submitted on the student's original enrollment application. With this insight, instructors can give individual guidance, as required. This guidance enables the student to progress at a rate which is most consistent with his capabilities. Instructors encourage pertinent questions and provide immediate answers.

Because of this individualized instruction, the course can be completed in 9 to 12 months, since the student works at his own speed. However, the student has up to 18 months to finish the course. In addition, individualized instruction enables the student to utilize his spare hours in profitable home-study, while remaining on his regular job . . . his earning continued.

The cost of the course, including lessons, references and texts, is nominal. The student may remit the complete fee at the time of his enrollment, or he may elect to pay a slight additional charge for the convenience of time payments.

ABOUT MTI INSTRUCTION

The Motorola Training Institute Home Study Course should not be considered as basic training in electronics. Applicants will be considered for the course if they can meet any *one* of the following prerequisites:

1. If he holds any FCC radio operator's license—except for the amateur "Novice" and other permits and licenses not requiring technical examinations.
2. If he is now a 2-way radio service technician.
3. If he has an adequate electronics background — knowledge of the principles of AC and DC circuits, vacuum-tube operation; basic circuitry of the receiver and transmitter; use of test equipment. Electronic equipment experience servicing is desirable, but not essential in all cases.
4. If he passes the school's entrance examination — this examination may be recommended by the Institute or may be requested by the applicant. This examination is completed at home, requires no supervision, has no time limit, and does not obligate the applicant in any way. Applicant merely completes and returns it to the Motorola Training Institute for grading and a prompt reply as to whether or not he has been accepted. » »

In a 2-way radio system, the proper setting of the transmitter modulation deviation is next in importance only to proper transmitter frequency adjustment. Precise techniques for measuring and setting transmitter modulation deviation are especially important in split-channel systems, since the FCC authorized deviation is only ⅓ that of a standard wide-band system. Higher than authorized deviation may cause interference to an adjacent channel user, whereas, deviation adjusted to less than the authorized bandwidth decreases the audio signal-to-noise ratio in the receiver, which in turn degrades the overall system performance. These point out the necessity for proper frequency and deviation adjustments, as indicated below, in achieving optimum system efficiency.

Measuring Instruments

Accuracy of test equipment is of prime importance to any user of radio communications equipment, but equally important is a knowledge of the characteristics of the measuring equipment under various conditions. As the case in point, the Motorola Frequency and Deviation Monitor is the leader in the field with respect to sensitivity, accuracy under conditions of variation in RF signal level, line voltage, and other environmental conditions. In common with most other meters however, it has the characteristic of responding differently to different wave shapes. Therefore, the use of most present-day deviation meters may lead to confusion and errors in setting deviation, if the pitfalls are unknown or disregarded.

The "ideal" deviation indicator would be one which responded instantaneously to the peak value of the modulation deviation, regardless of waveform. The only device which meets all these requirements is an oscilloscope. It responds instantaneously, showing the peak value of any waveform, no matter how complex. *Properly calibrated, an oscilloscope is the most accurate, reliable means for measuring and setting transmitter deviation.*

Since the oscilloscope displays the demodulated signal, it must be used in connection with a receiver which has a stable discriminator characteristic. In addition to the oscilloscope, we need then a receiver and a means to accurately calibrate the system. The Motorola Monitor fills both these require-

MODULATION DEVIATION MEASUREMENT

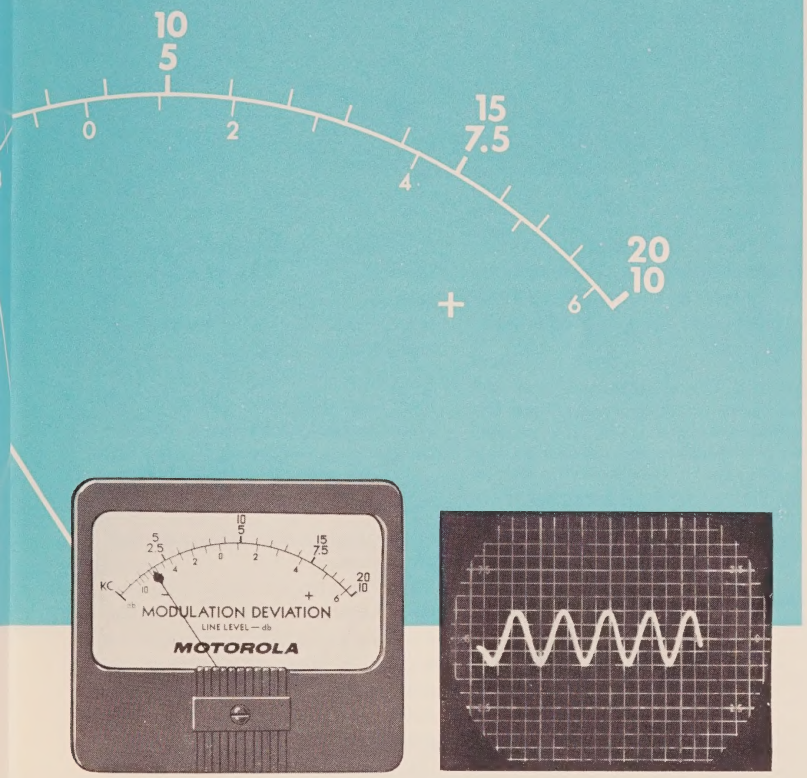


Fig. 1 — Oscilloscope Calibration for Split-Channel Condition.

ments admirably, since it provides a sensitive receiver with a proper discriminator and an accurate and reliable means to calibrate the oscilloscope. It even has convenient terminals on the front panel for connection of the oscilloscope. Furthermore, the new T1130A or T1131A monitors are provided with two modulation meter scales: 0-20kc for wide-band systems, and 0-10kc for split-channel systems.

Split-channel conversion kits are available for modification of older models, so that they too are provided with convenient oscilloscope terminals and are more accurate measurement devices for such systems.

Oscilloscope Calibration

The first step in the measurement of transmittter deviation is to calibrate the oscilloscope. This can readily be done by employing the transmitter which is to be measured. If a "Private-Line" radio unit is used, the tone oscillator must be disabled by removal of the "Vibrasender" resonant reed unit. This is necessary since the "Private-Line" tone contributes to the maximum deviation.

Proceed as follows:

1. The oscilloscope should be connected to the terminals on the front of the monitor. The monitor controls should be set up in accordance with the instruction manual.

2. Turn the IDC control on the transmitter chassis to the full clockwise position.

3. Feed a test tone into the transmitter audio input terminals on base stations or microphone plug on mobiles. Modulate the transmitter with this tone of approximately 1000 cps, so adjusted that the deviation, as read on the monitor deviation meter, is 2kc for split-channel or 6kc for a wide-band system. An audio oscillator must be used for generation of this tone, since a sinusoidal waveform is very important. The Motorola TEK-1 Transistorized Tone Generator is excellent for this purpose.

4. Adjust the vertical gain of the oscilloscope so that the total recovered audio pattern occupies some convenient height, i.e., four small squares (12 squares in a wide-band system). The split-channel case is shown in figure 1.

Having calibrated the oscilloscope, we have no further need for the modulation deviation meter and *its reading should be ignored from this point on.* It has already performed its important function of calibrating our oscilloscope.

With the oscilloscope calibrated as

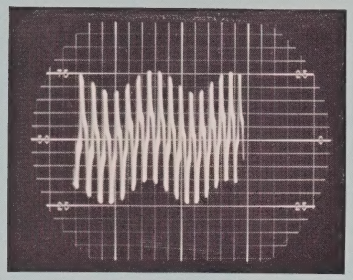
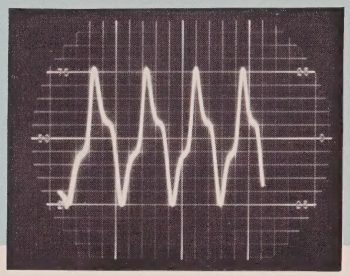


Fig. 3 — 5kc Peak Deviation for Combined "Private-Line" Tone and 1000 cps Modulation. (Note: "Private-Line" tone superimposed on 1000 cps tone.)

Fig. 2 — 5kc Peak Deviation as seen on the Oscilloscope. Note: waveform is fully clipped.



indicated, a recovered signal which occupies 10 squares (peak-to-peak) on the oscilloscope is equivalent to ±5kc deviation. For wide-band systems, a recovered signal occupying 30 squares (peak-to-peak) is equivalent to ±15kc deviation.

Measurement and Setting of Transmitter Deviation

Once the oscilloscope has been calibrated, the transmitted deviation can be properly adjusted by the following method.

A. *Transmitters operating in Standard Carrier Squelch Systems*

1. Adjust the 1000 cps input signal to 1 volt. This should drive the IDC circuit into full clip. See figure 2.

2. With this input signal level, the IDC control on the transmitter may be adjusted to provide a peak-to-peak recovered signal on the oscilloscope of 10 squares, which is equivalent to ±5kc deviation as shown in figure 2. Of course, a wide-band system would be adjusted for 30 squares (±15kc).

This procedure provides an accurate setting of the transmitter deviation control circuit.

B. *Transmitters Operating in "Private-Line" Radio Systems*

1. Check the "Private-Line" tone deviation. This may be read directly from the oscilloscope by depressing the transmitter push-to-talk switch on the test set. The tone deviation should be 0.5 to 1kc on split-channel units, and 1 to 2kc for wide-band units.

NOTE: Due to a slight increase in discriminator response at the lower frequencies, the oscilloscope will read high, thus an indication of 1.4 to 2.8 squares (peak-to-peak) is equivalent to 0.5 to 1kc for the split-channel unit. For wide-band units, the indication will be proportionately higher. This slight variation is only important when checking tone deviation. When setting maximum transmitter deviation as described below, it may be ignored.

2. Adjust the 1000 cps input signal level for 1 volt and note the resultant combined deviation of the 1000 cps modulation and tone signal modulation on the oscilloscope.

3. The IDC control on the transmitter should be adjusted to provide a peak-to-peak combined signal of 10 squares, equivalent to full 5kc as shown in figure 3. Wide-band units would be adjusted for 30 squares peak-to-peak.

These procedures provide an accurate setting of transmitter deviation control for "Private-Line" radios.

Emergency Measurement of Deviation

In the absence of an audio oscillator a loud sustained whistle of approximately 1000 cps can be used for a rough measurement of deviation. If this rough check indicates the need for resetting deviation, do so only under controlled conditions, using a 1000 cps tone as previously indicated. The calibration of the oscilloscope should always be performed with a solid controlled signal. Do not attempt to calibrate the oscilloscope with a sustained whistle as waveform distortion will most certainly prevent an accurate calibration.

Other Means for Measurement of Deviation

Another accurate means of measuring transmitter deviation is to use the Motorola T1020A Portable Frequency & Deviation Meter. This unit, properly used, permits the accurate measurement and setting of transmitter deviation from a peak-reading meter, which is unaffected by waveform. An oscilloscope is not required with this instrument. With this device, the transmitter deviation can be measured accurately, even with voice modulation.

Audio Levels

If, after setting deviation as indicated above, the modulation level in the system is still too low, check the microphone and audio stages in mobiles, or in base stations. In addition, check line levels as indicated in the instruction manual.

The foregoing procedures will insure that the transmitter will comply with FCC requirements, for maximum deviation. » » »

SERVICE HINTS AND SHOP NOTES

FIELD REPLACEMENT FOR 2C39 TYPE TUBES

A new UHF "lighthouse" tube is now available for direct field replacement of conventional 2C39 types. The new tube features a ceramic envelope in place of glass used previously plus other ruggedized characteristics to significantly improve reliability and service life expectancy.

The new tube is currently being incorporated in all 450 mc and 960 mc transmitter and exciter production units in the tripler-driver and final amplifier stages. It is recommended that this new tube be used as a field replacement for 2C39 types originally supplied in this equipment. Extensive engineering testing and analysis have verified the improved reliability and extended service life charactertistics.

The new tube is identified by Motorola Part Number 197T119A01 and is available from any Motorola Parts Depot. » » »

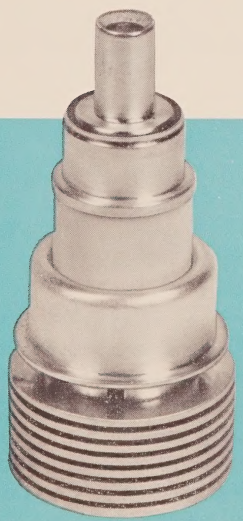


Figure 1; New "Lighthouse" Tube

DUAL SQUELCH NOISE QUIETING

In Dual Squelch "Private-Line" radios, if the noise squelch portion of the receiver squelch circuit does not "quiet" be sure to check the silicon noise rectifier diode along with the other components in that section of the circuitry. It is usually referenced CR101 on the receiver schematic diagram. This diode generally has a long service life and because of this it is sometimes overlooked when troubleshooting.

Replacement diodes are available from any Motorola Parts and Service Depot under part number 48K854093.

A precautionary note—the new diode may be damaged by excessive heat from the soldering iron during installation. For this reason, use a low-wattage soldering iron such as used for printed circuit repairs. » » »

IMPROVING STABILITY IN PRE-1952 "A" TRANSMITTERS

In some instances of converting pre-1952 "A" type transmitters (30 and 60 watt models) to split-channel operation, it may be desirable to incorporate a slight modification in crystal circuitry in addition to the normal conversion procedure. This oscillator modification represents a standard production change incorporated in all such transmitters manufactured after May, 1951. Figure 2 shows the original and modified oscillator circuitry.

The modification is easily accomplished (only two components required) and further improves the stability to assure optimum system performance, particularly beneficial in split-channel operation. Parts required are:

a. One (1) capacitor, 150 uuf; ±10%; 500 vdcw, part number 21R-2701.

b. One (1) capacitor; 50 uuf; ±10%; 500 vdcw, part number 21K-6553.

These capacitors are available from any Motorola Parts and Service Depot.

Make the changes as follows:

1. Remove resistor R101 (BEFORE Figure 2) and replace it with the 150 uuf capacitor (AFTER C105, Figure 2).

2. Remove the 30 uuf capacitor (BEFORE C101, Figure 2) and replace it with the 50 uuf capacitor (AFTER C101, Figure 2). » » »

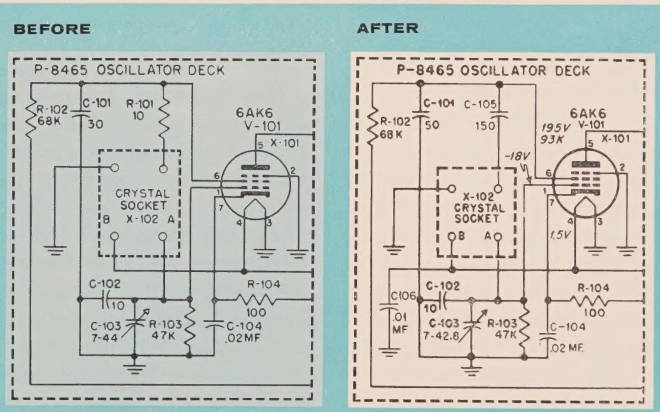
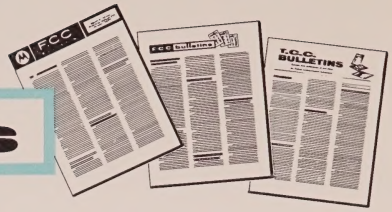


Figure 2; Pre-1952 "A" Transmitter Oscillator Circuitry Modification.

FCC bulletins



FCC ANNOUNCES SILVER ANNIVERSARY REPORT ON SALE

The 25th annual report of the Federal Communications Commission can be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D.C., for 65 cents a copy. The Commission does not stock copies for public distribution.

Because of its silver anniversary nature, the Commission's 1959 annual report includes historical background with a comparison of its workload today and a quarter of a century ago. Specific chapters cover "History of Regulation," and "Commission," "Litigation and Legislation," "National Defense," "Broadcast Services," "Safety and Special Radio Services," "Common Carrier Radio Services," "Field Engineering and Monitoring," "Research and Laboratory" and "Frequency Allocation and Use." The appendix contains "Electrical Communication Milestones" and "FCC Log Highlights." » » »

USE OF MOBILE UNITS IN PARTS 10, 11 AND 16 ABOARD AIRCRAFT

From time to time the question arises as to the use of two-way radio equipment in aircraft. With few exceptions, the Rules do not prohibit installation of mobile units in aircraft for those who hold a license in one of the radio services in part 10 and 11. In part 10, mobile units may be installed aboard aircraft on all mobile service frequencies in all services except in the Special Emergency sub-categories of par. 10.456 — School buses, par. 10.457—Communication Standby Facilities and par. 10.458 — Establishments in Isolated areas. Part 11 permits the installation of mobile units on aircraft in all services except those Business Radio users operating on the 3-watt frequencies of 33.14, 35.02, 42.98, 154.57 and 154.60 mc. In part 16, mobile units may only be installed aboard aircraft of licensees in the Railroad Service and in the Automobile Emergency Service on 452.55, 452.60, 457.55 and 457.60 mc, which are available only to associations of owners of private automobiles.

Land mobile units aboard aircraft are licensed as just another mobile unit in the system and their use is governed by the permissible communications in the various services. Such units, of course, are in addition to any compulsory radio equipment which is required to be installed in the aircraft under the Aviation Rules. Mobile units installed aboard aircraft must be operated within the authorized mobile area of operation. » » »

IGNITION NOISE SUPPRESION ADOPTED FOR "NEW" VEHICLES

Good news for all mobile radio communications users was issued from Detroit recently when the Automobile Manufacturers Association adopted a recommendation to incorporate ignition noise suppression into "all vehicles." This recommendation is the result of years of research and cooperation between the radio equipment manufacturers. It is expected that interference due to ignition systems noise will be greatly reduced when the recommendation is fully accomplished over a period of years. » » »

FCC ISSUES NEW CITIZENS RADIO BULLETIN

A new bulletin explaining licensing procedures for the Citizens Radio Service is now available from the FCC upon request. This bulletin, No. SS 1001, replaces the bulletin issued last year on this subject and brings the reader up to date on the Citizens Radio Service. » » »

ALL NEW OR ADDITIONAL INFORMATION MUST BE SIGNED AND NOTARIZED

All FCC applications and associated required information must be "personally subscribed and verified by the applicant" (signed and notarized). This applies to additional information filed during the pendency of an application as well as new or modified applications.

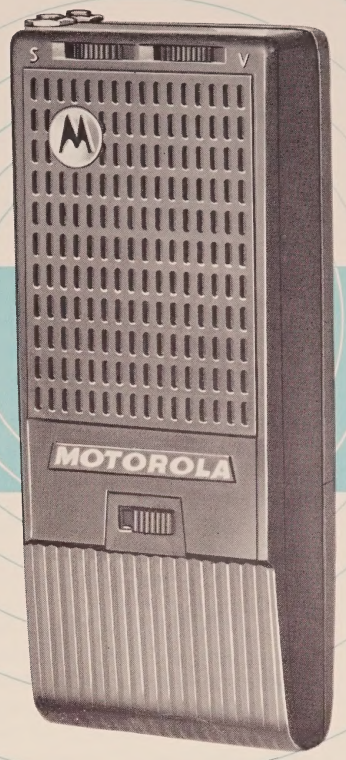
CORRECTION TO PREVIOUS ISSUE

The article on this page of the previous NEWSGRAM issue, Vol. 17, No. 1, entitled "Domestic Public Service Exempt from Split-Channel Rule" gave an erroneous impression and should be corrected to read as follows:

On December 31, 1959, an FCC ruling relaxed the technical standards for transmitters used in the Domestic Public Radio Service authorized prior to November 1, 1958, to the extent that the low-pass audio filter is not mandatory until November 1, 1963. For the full text of the rule refer to Sections 21.508 (f) and 21.605 (e) of the FCC Rules and Regulations. »

NEW products

FM pocket receiver with FULL 1/2 WATT AUDIO OUTPUT



Here is a complete 20-stage communications receiver, miniaturized to shirt-pocket size, providing a full one-half watt audio output. It's completely self-contained, including battery, speaker, volume and squelch controls and built-in antenna. This remarkable little unit provides loud, clear signals at extended distances from base stations and mobile transmitters, allowing personnel to range widely on foot and still receive instructions and reports from their base of operations. It is frequently used along with a miniaturized transmitter to extend two-way radio communications to the man-on-foot. These units operate on the VHF frequencies assigned to the base station—mobile radio networks used in police work, fire fighting, forestry and conservation work, outdoor construction projects and many other enterprises where men on foot need instant radio contact with their operating bases.

Transistorization, of course, is the key development which has made such a receiver possible. This unit utilizes no less than 17 transistors as well as seven tiny semi-conductor diodes. There are two precisely ground quartz crystals to control the frequency of the intermediate frequency stages. A double-conversion superheterodyne circuit is used, the same as used in full size communications receivers. The entire receiver circuitry is built into a molded plastic housing with a cellular structure for holding individual modular stages. The unit has a patented Motorola cast-in-plastic 455 kc. I-F filter, FM noise squelch circuit, push-pull audio output stage and many other outstanding features of the Motorola mobile and base station receivers, so well known for their high quality and long life.

One of the most interesting features of this tiny receiver is the unusually low current drain required and the high operating efficiency attained. In the normal standby condition ("squelched"), the receiver draws only about 6-7 milliamperes of current. Compare this with the 200 ma. or more taken by even the smallest, simplest one-cell flashlights! This insignificant current drain, of course, is possible because the transistor has no filament to heat up as in the conventional vacuum tube. Now, when signals are received, the squelch circuit opens and the audio stage operates normally. At this time the current drain increases in exact proportion to the volume control setting and the nature of the incoming signal. Thus, the receiver draws only the current actually required to reproduce the received signal at the desired loudness. This can range up to 80 ma. for the full one-half watt rated output. This type of operation produces an extremely high operating efficiency compared with conventional tube-type equipment.

The receiver operates up to 140 working hours on one set of mercury cells. This is three and one-half weeks at the usual 40-hours-per-week rate. A re-chargeable nickel-cadmium battery can be used and the receiver can be stored in a battery charger overnight or on week-ends to assure a full day's service every day without replacing batteries. This system is recommended as the most convenient and most efficient for the average user. » »

MOTOROLA MA-1
REMOTE ALARM AND CONTROL

Motorola's new MA-1 Remote Alarm and Control System, now in production, has been designed to provide a means of alarming remote sites of extensive microwave systems. Keynoting the new system are the qualities of top reliability, flexibility, and ease of control. As many as 24 remote microwave stations may be incorporated in the system with up to 20 alarm points at each station. In addition, the optional control of up to 19 "on-off" functions at each remote station may be installed on an "add-to" basis. Thus, provision is made for a total of 480 alarm points and 456 control points.

"Change-of-Status" Featured

Any change of status of an alarmed point at a remote microwave site will result in the transmission of an "Alert" signal to the Indicator Station equipment with concurrent identification of the remote station which originated the signal. At the Indicator Station, the operator—notified visually and orally of the "Alert" signal—initiates a "Scan" sequence of the affected remote station to find the exact source of the alarm. He does this merely by momentarily depressing two pushbutton switches. When the automatic "Scan" sequence has been completed at the remote station, a neon lamp on an Alarm Module of the Indicator Station will show the location of the fault. After repairs have been completed, a new "Alert" signal will indicate the change of status. The previously lighted neon will then go out after completion of a new interrogation of the Remote Station. This feature provides a positive indication of completion of repairs; it is not necessary for the operator to continuously monitor the Alarm Module.

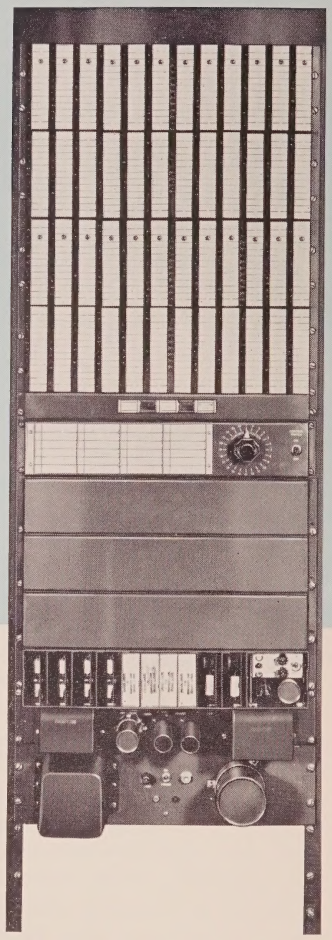
It Remembers Intermittents

Should an intermittent outage initiate the "Alert" sequence and then return to normal operating condition before the Indicator Station operator can interrogate the Remote Station, memory circuitry at the remote site will retain the location of the temporary outage. Upon completion of the "Scan" sequence, neon lamp indication will show where the intermittent outage occurred; a new "Alert" signal will immediately be received, and a second interrogation of the Remote Station will cause the neon lamp to go out. This will show the first alarm to have been caused by an intermittent outage.

Thermal delay relays may be installed where desired in order to forestall transmission of an "Alert" signal for expected outages of short duration such as would occur in switchover from primary to emergency power supply. Such switchover would ordinarily be indicated by another alarm point.

Independent Control Points

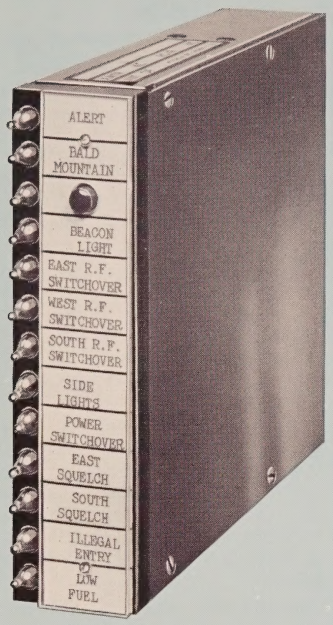
Nineteen points at each microwave site may be equipped for remote "on-off" control from the Indicator Station, a total of 456 control points. These control points are not necessarily associated with alarm points; reporting-back from a controlled point may be obtained by alarming the point in the MA-1 Remote Alarm and Control System, or by making use of a telemetering channel entirely unassociated with the MA-1 System.



Indicator Station Rack-Mounted Equipment

Ease of Maintenance

Printed circuit boards and modular construction simplify maintenance. Alarm modules may be easily interchanged; routine checking is all that is normally required. The possibility of tube failure has been entirely eliminated because no tubes are employed in the MA-1 Remote Alarm and Con-



Typical Alarm Module Showing Neon Lamps Opposite Location Designators

trol System, including the power supply. A simple lamp-test procedure rapidly checks all neon indicator lamps of the Alarm Modules; neon lamps are easily replaced when necessary.

Reliability

Complete transistorization of the MA-1 Remote Alarm and Control System raises the quality of equipment reliability to the highest possible degree. Heat production is reduced to a negligible amount and there is, of course, no requirement for forced ventilation. Relays have been specially selected for long and trouble-free life. System reliability is inherent in system design. Dual tone codes prevent falsing which might otherwise arise because of noise bursts; multiple "Alert" signals received simultaneously cannot cause "hang up" of sequential relay operation. Failure of the primary power source in the middle of relay operation and tone code transmission can still cause no permanent equipment "hang up".

Designed for Flexibility

Flexibility is "built-in" to the Motorola MA-1 Remote Alarm and Control System. Both alarm points and control points may be added to the system as the need arises until each Remote Station is equipped with 20 alarm points and 19 control points. Furthermore, multiple Indicator Stations may be installed at various locations throughout the microwave system; in the latter case, it is customary to designate one Indicator Station as the master station, with manually initiated operations (namely, interrogation and control sequences) originating from this point.

No Extra Multiplexing Required

The Motorola MA-1 Remote Alarm and Control System achieves communication by direct modulation of the microwave RF carrier. Thus the Alarm System is completely independent of any subcarrier multiplex equipment. For its operation, the MA-1 Remote Alarm and Control System relies entirely on the microwave RF facilities and on the AC primary power source at each station.

Low injection level requirements and the low spectrum occupied by the tones provide equipment compatibility for use in systems which employ single sideband multiplex, with no sacrifice of channel capacity. In addition, a Baseband Order Wire, restricted to frequencies below 2600 cps, may be operated in the spectrum below the alarm tones.

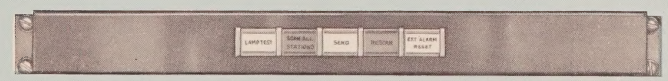
The Motorola MA-1 Remote Alarm and Control System has been primarily designed for microwave, but any equipment capable of transmitting audio tones in the 2600 cps-3600 cps range may be used to communicate the alarm and control intelligence. A 4200-5200 cps band is also available.

No Critical Timing Periods

Frequency coding is employed by the MA-1 Alarm and Control System with two different audio tones being used for each type of operation. Sequential relay operation results from reception of the tone codes, but circuit design is such that relay sequences are independent of any critical timing periods, either during pulse transmissions or during the intervals between pulses. Proper decoding is not dependent on critical pulse lengths, and the equipment can tolerate reasonable delays or partial losses of individual tone signals without causing erratic operation.

Low Microwave Loading

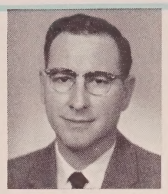
Only short periods of time are required by the alarm and control tones during any particular sequence of tone signals. Highly sensitive alarm receivers allow the use of low baseband injection levels. These factors act to minimize the loading effect upon the microwave system, even during the short time that tone code pulses (transmitted only during interrogation and alarm reporting sequences) are employed in modulating the microwave carrier. » » »



Illuminated Pushbuttons, Mounted on the Alarm Panel, Control the MA-1 Alarm System

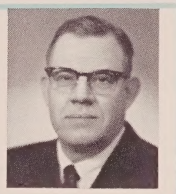
TRANSMISSIONS . . . on Motorola Personnel

Hibbard E. Bannard has been appointed Manager, National Parts Depot, by Motorola Communications & Electronics, Inc. In his new position, Bannard coordinates activities of the company's four area parts depots located across the United States.


Hibbard E. Bannard

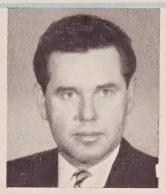
Bannard joined Motorola in 1946 as a sales administrator for the two-way radio marketing department. In 1957, he was named assistant manager of the Parts Depot, and became Manager of the Midwest Area Parts Depot last September. Offices for Bannard are at 4910 W. Flournoy St., Chicago.

A. L. Wegner has been named Manager, Midwest Area Parts Depot, by Motorola Communications & Electronics, Inc. In his new position, Wegner supervises parts operations for the company throughout a 13-state area extending from Ohio and Kentucky to North and South Dakota.


A. L. Wegner

Wegner has been with Motorola in various capacities for more than 20 years. Most recently, he was associated in administrative capacities with the parts and service department. His office is at 4910 W. Flournoy St., Chicago.

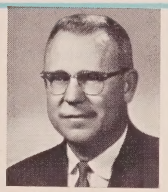
Gordon Mead has been named manager of the account executive program in the West for Motorola Communications & Electronics, Inc. Headquartered in Sacramento, California, Mead directs account executives in the 10 western states of Washington, Oregon, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, Arizona and California.


Gordon Mead

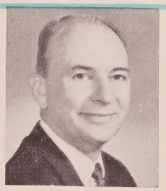
Mead joined Motorola in 1952 as a radio communications representative and later became a zone sales manager in California. An account executive the past two years, Mead has served the states of California, Nevada and Utah. A graduate engineer, Mead was a commander in the U. S. Navy during World War II.

Myron Savage

Richard Pargeter has been appointed manager of the new western Oregon zone and *Wallace Beebe* has been named to direct the central Oregon zone.


Richard Pargeter

Both men are headquartered at 8665 S. W. Canyon Road, Portland, regional sales office for Motorola. In their new positions, Pargeter and Beebe supervise the sale of 2-way mobile radio communications products to public safety, industrial, commercial and transportation organizations.


Wallace Beebe

Named account executive in Oregon is *Myron Savage*, whose offices are at the same address. Savage specializes in serving radio users with extensive or widespread communications requirements. » » »

Radio Units Reported Missing

Two Motorola D2166V mobile radio units with a type 1-A tone system have been reported stolen from two fuel oil trucks in Clearwater, Florida. Serial Numbers on these radios are D1163 and D1164. Information on these units should be forwarded to W. D. Booth, Jr., Chief of Police, Clearwater, Florida.

Speeds Oil Tool Service has reported the theft of a Motorola T51-G mobile radio carrying a Serial No. 2168. Information on this unit should be forwarded to Speeds Oil Tool Service, 110 East Betteravia Road, Santa Maria, California.

The Illinois Department of Public Safety has reported theft of a Motorola MOTRAC 2-way radio, Serial No. A 23864. Information should be sent to Harry Carson, Supervising Inspector, Department of Public Safety, 1012 Myers Building, Springfield, Illinois.

A Motorola "Handie-Talkie" Portable Radiophone, FHTR-1B, serial number 2043, operating on 48.460 mc has been reported stolen from the Cherry-Todd Cop Electric Company at Mission, South Dakota. Information on this unit can be forwarded to the Cherry-Todd Company.

A Motorola "Handie-Talkie" Portable Radiophone, Model No. H 23 AAC-1101 AM, Serial No. A 18389, two tone gray in color and inscribed "Rescue" thereon in red paint has been stolen from the Rescue Truck of the Long Beach Fire Department in Nassau County, New York. Information regarding this unit should be forwarded to Lt. Joseph F. Lane, Detective Division, Police Department, City of Long Beach, New York.

The Railway Express Agency has reported theft of two Motorola type T43GGV-7 radiophones, Serial No. 1064 and 1070. Information regarding these units should be forwarded to the Motorola Newsgram. » » »

MOTOROLA NEWS GRAM

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Communications Division

SALES
directory of
SERVICE

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Vice Pres. and Area Mgr.
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OXFORD 7-3660
TWX Millbrae, Cal. 31

REGION 101
ROBERT L. KRANHOLD, MANAGER
12034 Riverside Drive
North Hollywood, California
POPLAR 9-3200 or TRIANGLE 7-9973
TWX—NORTH HOLLYWOOD 7450

REGION 102
BERNARD T. OLSON, MANAGER
P. O. Box 577,
790 Laurel St.,
San Carlos, Calif.
LYTELL 1-7191

REGION 103
HARRY TARBELL, MANAGER
8665 S. W. Canyon Rd.,
Portland 25, Oregon
CYPRESS 2-3511
TWX PD 122

REGION 104
ROBERT W. BOYTER, MANAGER
467 E. Third, South,
Salt Lake City 11, Utah
DAVIS 2-5615
TWX SU 249

REGION 105
JOHN KOBIELUS, MANAGER
12304 Riverside Drive,
North Hollywood, California
POPLAR 9-3200 or TRIANGLE 7-9973
TWX—NORTH HOLLYWOOD 7450

Area 2 MIDWESTERN AREA

ROBERT F. DAVIS,
Vice Pres. and Area Mgr.
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ESTEBROOK 9-5200

REGION 201
WILLIAM HAWKS, MANAGER
3125 Wyandotte St.,
Kansas City 11, Mo.
PLAZA 3-1241

REGION 202
HAAKON HERIGSTAD, MANAGER
2101 Hennepin Ave.
Minneapolis 5, Minn.
FRANKLIN 7-0374

REGION 203
ERIC GOLEAS, MANAGER
4900 W. Flournoy St.,
Chicago 44, Ill.
ESTEBROOK 9-5200

REGION 204
ROBERT E. BRITTIN, MANAGER
403 Michigan National Tower
Lansing 8, Michigan
IVANHOE 7-5977—5978

REGION 205
JOHN G. NAUMAN, MANAGER
8005 Plainfield Road,
P. O. Box 111,
Cincinnati 36, Ohio
TWEED 1-5200

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Fair Lawn, New Jersey
SWARTHMORE 1-1700
TWX FAIR LAWN 326U

REGION 301
ED VOGEL, MANAGER
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Needham Heights 94, Mass
HILLCREST 4-1600

REGION 302
JOHN F. FUSSELL, MANAGER
15-00 Pollitt Dr.,
Fair Lawn, New Jersey
SWARTHMORE 1-1700
TWX FAIR LAWN 326U

REGION 303
WARREN CORWIN, MANAGER
11 Wesley Avenue,
Glenside, Pennsylvania
CAPITOL 4-1900

REGION 304
HOYT STOUT, MANAGER
1515 Wood St.,
Pittsburgh 21, Pa.
CHURCHILL 2-5500

REGION 305
WARREN BORNHOEFT, MANAGER
313 Crain Highway S.E.
Glen Burnie 6, Maryland
SOUTHFIELD 1-4900

REGION 306
JOHN BLANTON, MANAGER
Dilworth Post Office Bldg.,
208 East Boulevard,
Charlotte 3, North Carolina
EDISON 3-1181

Area 4 SOUTHERN AREA

ROBERT N. SWIFT,
Vice Pres. and Area Mgr.
7138 Envoy Court,
Dallas 7, Texas
FLEETWOOD 7-3923
TWX DL 527U

REGION 401
CHESTER L. PRINGLE, MANAGER
Mid America Bldg.,
301 N. Colorado,
Midland, Texas
MUTUAL 3-1872 and 3-1873

REGION 402
DOUGLAS F. BALL, MANAGER
Suite 201, 3203 Mercer St.,
Houston 27, Texas
JACKSON 6-2301; 6-2302;
and 6-2303

REGION 403
J. M. HARVEY, MANAGER
4631 North Bolevard,
Baton Rouge, La.
DICKENS 2-3011 or 8-3294

REGION 404
LAVANCE CARSON, MANAGER
1958-B Monroe Dr., N. E.,
Atlanta 9, Georgia
TRINITY 5-8714

REGION 405
ROGER W. MULFORD, MANAGER
502 Professional Bldg.,
Fort Lauderdale, Florida
LOGAN 4-9673
TWX FT LDL 7802

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SPAULDING 2-6500

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ESTEBROOK 9-6700
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Telegrams: FAX—WASH., D.C.
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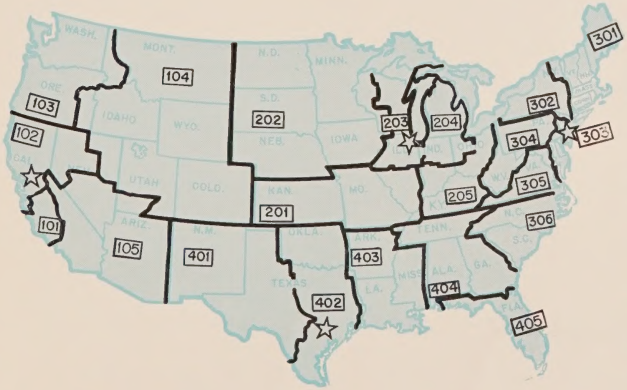

WESTERN AREA PARTS DEPOT
1616 Rollins Road
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OXFORD 7-3660
TWX Millbrae, Cal. 31

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ESTEBROOK 9-5200
TWX CG 2570-U

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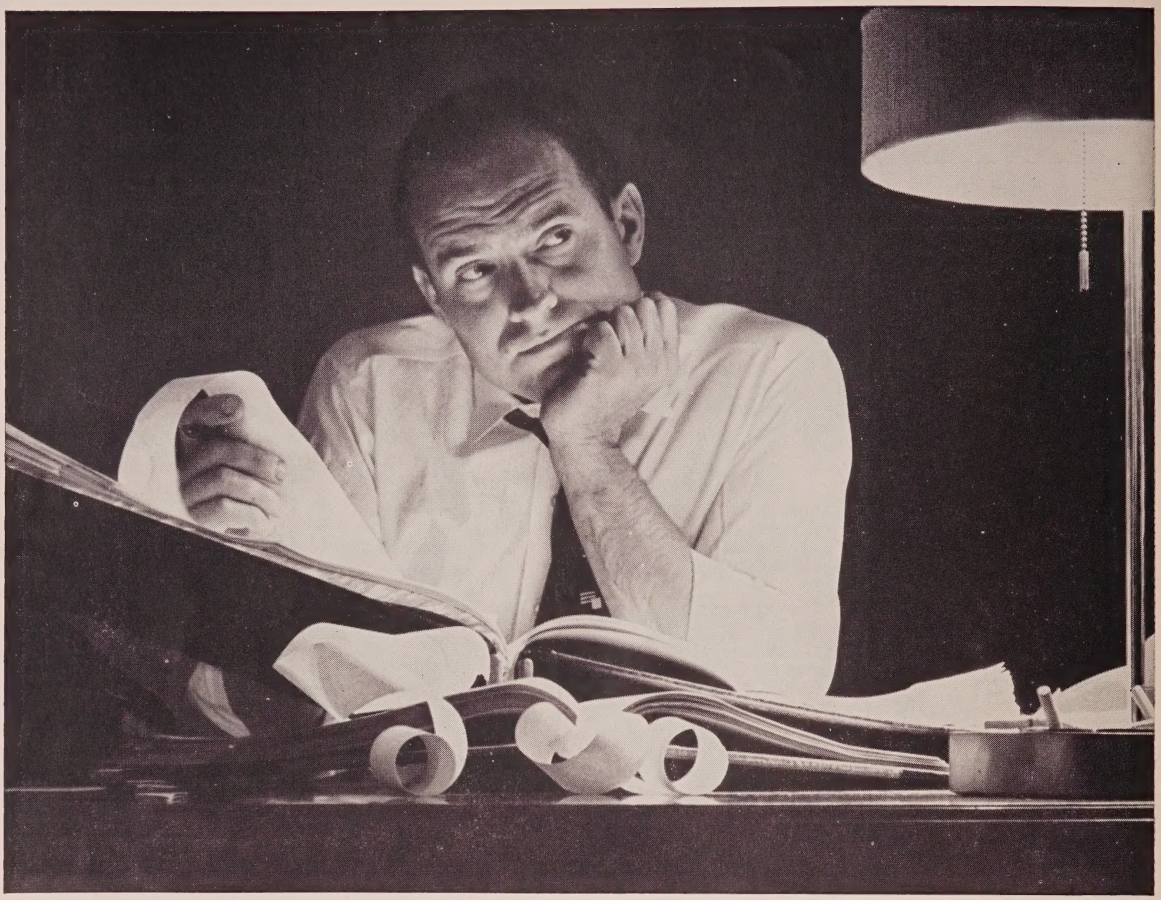

Can Motorola 2-way radio cut my bills?

If you operate vehicles, you bet it can! Here's how: Drivers radio-in from their vehicles and are dispatched directly from job to job. The result: less backtracking, less "deadheading"—you get more for your money from men *and* vehicles—and you cut phone bills, gas and oil bills and maintenance bills.

But am I big enough for 2-way radio? Yes . . . even if you operate only one or two vehicles, 2-way radio saves money, mileage, time—gives you *more calls per day* —and much better service for your customers.

Can I afford it? If your drivers phone in just a few times a day, *your radio will pay for itself.* You can own or lease Motorola 2-way radio for less than $1.00 per day per vehicle. That charge covers everything—equipment, installation and maintenance.

Can you prove it? We'll be *glad* to! Call in your local Motorola representative (see Yellow Pages under "Radio Communications"). He will show you the dollars and cents proof of how Motorola can build profits for *your* business. He will give you a *demonstration of a nearby system in action.* Let him show you *why* Motorola equipment is more advanced, more reliable, more economical. Ask him about service and factory responsibility for your system. You'll see why, with the most experienced buyers—police, fire, railroads, utilities, etc., *Motorola outsells all other makes combined!*

MOTOROLA 2-WAY RADIO

Motorola Communications & Electronics, Inc., 4501 Augusta Boulevard, Chicago 51, Illinois

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